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Symposium on Tuberculosis*

1. The Extent of the Public Health Problem in Ontario

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IN 1935 the tuberculosis death rate was 36 per 100,000, the lowest rate ever recorded in the province. But even with this record low rate, 1,303 deaths, a very considerable volume of mortality, were charged to tuberculosis. In 1935, 7,053 deaths were charged to heart disease and 4,214 to cancer but it is questionable whether either of these mortality volumes is as significant from a public health viewpoint as the fewer number of deaths charged to tuberculosis. It is the age distribution of the deaths from tuberculosis that makes it still one of the most important public health problems. During the first 50 years of life tuberculosis killed more than either heart disease or cancer. Of the 1,303 deaths, 787 or 60 per cent. were contributed by the age group of 15-49 and the majority of these by the age groups of 20-35. In that 35 years of life from 15-49, made up of adolescence, young adult life and early maturity, life's most active years, tuberculosis was responsible for more deaths than any other disease and was second only to the group of external causes—accidents, suicides, homicides, etc.—as chief cause of death. This means that the rising generation, including the medical students, and more strikingly so the nurses in training, adolescents, young adults in general and even the school children are more apt to die from tuberculosis, before they reach 50, than from any other disease. In other words, tuberculosis is still the greatest menace among all diseases that face adolescence and young adult life. This is especially true of young women. Tuberculosis still accounts for 1 in every 4 or 5 deaths of women in the age

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group 20-29. And this is so in spite of the fact that its mortality rate to-day is only a third of what it was 30 years ago.

But even in those under 15 years of age, tuberculosis took a heavy toll. It accounted for 133 deaths in this younger age group. It ranked third as a cause of death in the 1-4 age group, fourth as a cause of death in the 5-14 age group. In childhood, up to 15 years of age, it accounted for many more deaths than scarlet fever, more than measles (as far as vital statistics records show), nearly as many as whooping cough, and more than appendicitis.

Later life was by no means exempt from its ravages. From 50 to 59 it is the recorded cause of 126 deaths and in the age group of 60 and over tuberculosis is charged as the cause of 122 deaths.

But the mortality is not all the public health problem of tuberculosis. There is also that of morbidity, about the exact extent of which there is little enough information. We all know, in a general way, its extent in our individual circles of life, our families, our associates and our municipalities. In fact we know it too well, we are too familiar with it, so accustomed to it and its greater prevalence in past years that we fail to measure accurately its extent and appreciate its significance. But there are 3,233 beds for tuberculosis in Ontario sanatoria. They are always full and there is always a long waiting list, and these by no means represent all the tuberculosis cases or even the known ones. There are probably 5,000 to 10,000 cases of tuberculosis, perhaps more, in Ontario to-day.

It is not the purpose here to estimate the cost of this problem, of the hospitalization, of the medical and nursing care, of the incapacitation, or even of the funerals. The figures of mortality and morbidity are sufficient in themselves to indicate the size of the problem from a purely monetary standpoint.

And the third feature of tuberculosis as a public health problem is the fact that it is a communicable disease. Every death, every case, uncontrolled, recognized or not, indicates a possible focus of infection to yield in 1, 2, 5 or 20 years' time new cases and more deaths and these in return to yield others. We know how it spreads in families, and in those associated with a case. McPhedran's data provided adequate proof of that. Ferguson in Saskatchewan showed how it spread in school under certain conditions. And Riddell has indicated how it spreads in industrial contacts. But this is not to discuss the epidemiology of tuberculosis—it is merely to indicate the extent of the problem. However, the contagious character of tuberculosis increases the public health problem by making it necessary for the public health authority to provide beds for the segregation and training of cases in order that they may learn to live in association with others without being a menace.

So, in summary, in spite of the record low death rate of tuberculosis to-day, the *volume of mortality* it exacts from the 15-49 age group—adolescence and young adult life and early maturity—where it is second only to the group of external causes as chief cause of death, and the by no means inconsiderable volume of mortality it takes from those in younger age groups, where it causes more deaths than diphtheria, scarlet fever, or measles and nearly as many as whooping cough; secondly, the uncertain, but very substantial *volume of*

morbidity, 5,000-10,000 cases or more, in Ontario; and thirdly the *contagious character* of tuberculosis by which one uncontrolled case begets another and that another so that beds must be provided for the segregation and training of cases—these three factors make it one of the chief public health problems of to-day.

But the future is not dark. Not only has the mortality decreased, decreased amazingly, in the past 35 years, but, as Brink has shown, the amount of infection in the population of Ontario has decreased very significantly also. And McPhedran has shown that cases can be controlled and trained so as not to spread tuberculosis. Perhaps the outstanding evidence of that is the Papworth Colony where children are growing up in the tuberculosis colony, without contracting the infection. That augurs well for the future—if we do not lose sight of the problem.

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2. The Early Diagnosis of Tuberculosis

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FOR many years the emphasis in anti-tuberculosis work has been placed on early diagnosis. We have recognized that unless pulmonary tuberculosis is discovered in its incipient stage the diagnosis is of little value to the patient or to the community. Despite this knowledge we find that at least 80 per cent. of the patients admitted to sanatoria to-day are in a moderately or far advanced stage of the disease. Whitney (1) reports that in 1931 of 37,665 cases admitted to 274 institutions in the United States only 16 per cent. were classed as minimal while 30 per cent. were moderately advanced and 54 per cent. far advanced. While these figures were compiled six years ago, they represent quite accurately the present situation in Ontario. These are only a few of the data which might be quoted to show that our case-finding methods have been inadequate. We have not, as the years have passed, discovered and placed under treatment an increasing number of early cases. We had hoped that the education of the public and the medical profession regarding the symptoms and signs of early tuberculosis would result in the discovery of an increasing percentage of minimal cases. These hopes have not been realized. The explanation of this failure lies probably in our inefficiency in applying the methods of diagnosis applicable in manifest tuberculosis and our not realizing that early diagnosis is in a great measure dependent on the recognition of lesions which have not impaired health.

Since the recognition of early tuberculosis rests on the summation of many

probabilities, I shall review as briefly as possible the main features in the diagnosis of active or clinically manifest disease.

ACTIVE OR CLINICALLY MANIFEST DISEASE

History

A carefully taken history is absolutely essential. It is important to scrutinize the patient's childhood health and to discover the possibility of exposure to tuberculosis at that time, whether from members of the family or from others. Intimacy of contact is of greater importance than relationship since tuberculosis is not hereditary. Lack of contact should not be allowed to weigh against the diagnosis since definite exposure can only be established in about half the cases. Of equal importance is a knowledge of the daily life of the patient, his habits of work and play, the possibility of worry and strain, in fact, anything which may affect his health either directly or indirectly.

When questioning a patient regarding his symptoms it is well to remember that the majority of tuberculous patients tend to minimize their troubles, probably because the onset of their illness has been so gradual that the sufferers have become accustomed to them.

The most common symptom is fatigue—an unusual mental and physical weariness at the end of a day's work. Cough and expectoration are common and are of most significance when they appear gradually without the introduction of a cold. Cough is likely to be excited by exertion, laughing or talking. Expectoration occurs most frequently in the morning and after meals. The patient may complain of having "one cold after another". Dry pleurisy or pleurisy with effusion which occur apart from pneumonia, rheumatic fever and heart disease, are tuberculous. The mere fact of their appearance should make a diagnosis of tuberculosis. Patients suffering from dry pleurisy should be carefully examined to exclude intra-pulmonary disease and they should be carefully watched for a long time. A study of case histories shows that active pulmonary tuberculosis develops within five years in 30 to 40 per cent. of untreated cases of dry pleurisy. Patients suffering from pleurisy with effusion should have prolonged treatment since their chance of developing pulmonary tuberculosis within five years is over 50 per cent.

Haemoptysis is one of the most striking symptoms of pulmonary tuberculosis. It frequently occurs early in the disease and may be the first symptom to attract the patient's attention. Blood-spitting of a drachm or more should always be considered as due to tuberculosis until proved to the contrary. This symptom occurs in probably 50 per cent. of cases. Even blood-streaked sputum should lead the medical attendant to carry out an exhaustive study of his patient.

The remaining symptoms such as fever, night sweats, loss of weight, anorexia, etc., need only be mentioned. They are well known and have not the striking significance of those which have just been described. It must not be forgotten that these may be the only symptoms present and that in early disease they may be very slight. None of this group is pathognomonic and the value of each must be determined by a complete physical examination and special investigation.

Physical Signs

Physical signs have a definite value in the early diagnosis of tuberculosis but it must be emphasized that they give but a partial indication of the extent and character of intrapulmonary disease. These limitations hold true not only for diagnosis but also for the estimation of the activity or quiescence of a lesion. Physical signs are not an index of activity. Fresh infiltrations may occur without signs and râles may persist for years over lesions which are functionally cured. *It is important to stress the limitations of physical examination since one so often hears the physician remark "I suspected tuberculosis from the symptoms but I could not find anything in the chest." It might better be: "I suspect early tuberculosis* because *I cannot find anything in the chest."*

Of the various methods of examination auscultation yields the most definite information. The most constant and significant sign is a shower of fine or medium moist râles heard constantly over one or other apex with or after expiratory cough. These râles are not heard on quiet breathing but are audible following immediately after the effort of cough or during the early part of the succeeding inspiration. Diminution of the normal intensity of the respiratory murmur is also one of the earliest signs. This is followed by prolongation of expiration and other changes in the normal vesicular sounds. Increased conduction of whispered voice frequently occurs over early lesions but there is seldom much change in the transmission of the spoken voice.

Inspection is probably next in importance to auscultation. Slight lesions may cause delayed or lessened respiratory excursion of the upper part of one side of the chest. One must, however, be certain that such changes are not due to skeletal deformities. One should also note such details as complexion, malar flush, inequality of the pupils and exaggeration of the supra-clavicular or infra-clavicular fossae. Clubbing of the fingers and curving of the nails is suggestive but not diagnostic of tuberculosis.

Palpation confirms inspection and may add something of value in the discovery of skin hyperaesthesia, muscle spasm or atrophy.

Percussion is an art and one of the most difficult to acquire. Slight changes in resonance are probably most readily shown by a narrowing of the width of apical resonance—that band of projected resonance called Kronig's isthmus.

Laboratory Procedures

Of the various laboratory procedures of aid in diagnosis, sputum examination is the most valuable. Our practice is to examine ten concentrated specimens. If these are negative, several tubes of the various media suitable for the cultivation of the tubercle bacillus are inoculated. Not infrequently we obtain positive cultures from sputum which has been negative on microscopic examination. In cases where doubt remains, guinea-pigs are inoculated.

The estimation of the rate of sedimentation of the erythrocytes gives information of great value. This test is not specific and any lesion characterized by inflammation and cell damage may cause an increase in the rate of red cell sedimentation. With this limitation in mind this test will be found very informative in diagnosis and in treatment. It is a much more sensitive index of activity than is the pulse or temperature record. Differential leucocyte counts,

as described by Medlar, Sabin and others, are helpful but where large numbers of patients are examined they are so time-consuming that their usefulness is limited.

Intracutaneous Tuberculin Test—The intracutaneous tuberculin test is of great value. This test is the only one which can establish unaided the presence or absence of tuberculous infection. While too much weight should not be placed on the intensity of the reaction in estimation of the clinical importance of a lesion, in the main it may be said that a vigorous reaction to 1/100 of a milligram of tuberculin suggests a recent infection or a recent extension of an old one. A negative reaction with negligible exceptions means absence of infection. In Western Ontario, at least, it can no longer be said that a high percentage of people are infected by the time they reach twenty-one years of age. In the tests which we have been carrying out upon nurses and university students during the past three years, only 30 per cent. to 40 per cent. have reacted positively. With a lessening in the numbers of infected the value of this test is increased. In diagnosis a negative reaction gives more information than does a positive one. The positive reaction is of most value in selection of contacts who require further examination.

EARLY OR LATENT TUBERCULOSIS

During the past decade, led by Opie, McPhedran and others, we have come to realize that early diagnosis is in a great measure dependent on the recognition of lesions which have not impaired health. We have learned something of the importance of latent tuberculosis which Opie defines as being "tuberculosis which is unaccompanied by significant symptoms or physical signs". Opie, McPhedran and Hetherington began the investigation of this phase of tuberculosis in 1924 and 1925 by examining the school children in Philadelphia. The intracutaneous tuberculin test was applied and the positive reactors were given x-ray examination. From this beginning many other investigators undertook surveys and the field was extended to include adolescents and young adults. As a result of these researches there has been a significant advance in our knowledge of tuberculosis. We know that in children, adolescents and young adults there frequently occurs grave active disease which during its period of latency produces no evident symptoms and no recognizable physical signs. The period of latency is variable and may extend from a few weeks to as long as three or four years. During this period the disease may descend from an insignificant apical focus into the sub-apical areas and may readily reach a moderately advanced stage without producing symptoms. It is most important that these lesions be recognized as they form the reservoir from which great numbers of our advanced cases are drawn and it must further be stressed that such recognition depends on the correct interpretation of technically adequate x-ray films.

Opie and McPhedran (2), in writing on the clinical significance of latent pulmonary tuberculosis, state among their conclusions:

"The potential significance of latent apical tuberculosis varies with age and the anatomic extent of the lesion. After forty years of age these lesions are usually stationary.

"In younger persons scant lesions projecting below the border of the second posterior rib are followed by clinically manifest tuberculosis in approximately 6 per cent. of cases.

"Of latent apical lesions that extend from above below the clavicle, approximately one-half become clinically manifest tuberculosis.

"Persons less than forty years of age with latent apical lesions scattered over an area approximately one-half of the apex above the clavicle or with more extensive lesions, even though they are in apparently good health, should receive the treatment of clinically manifest tuberculosis until repeated roentgenographic examinations have shown that the lesion is not progressive."

Clinicians have been slow to allow x-ray examination to assume its rightful place over other diagnostic procedures. We now acknowledge that no thoracic examination can be considered complete without films of the chest. They reveal to us lesions which lie deep in the lung or those masked by emphysema. They show us the so-called silent cavities, localized pneumothorax, small pleural effusions and miliary tuberculosis. Many physicians are unwilling to admit that the x-ray can do more than confirm and amplify physical examination. They insist that active disease does not exist without symptoms and that the state of a lesion cannot be told from the roentgenograph. However, the recent researches on latent tuberculosis have demonstrated clearly that serial radiographs reveal that lesions progress and retrogress without symptoms or signs. In many of these cases the various laboratory tests reveal nothing so that serial x-rays give us the only decisive evidence of activity. It can be definitely stated that while it is difficult to estimate the state of a lesion from any one film, serial radiographs will, in early disease, give us definite evidence regarding the stability or instability of the lesion.

In conclusion I would repeat the five diagnostic points as laid down by Lawrason Brown. Any two or more of these are diagnostic of manifest tuberculosis:

1. Haemoptysis of a drachm or more.
2. Pleurisy with effusion.
3. Persistent râles above the third rib and the third vertebral spine.
4. A parenchymatous lesion in the x-ray film in the same area.
5. Tubercle bacilli in the sputum.

However, we will miss many cases of active disease if we limit our horizon by these five danger signals. In daily practice we must keep in mind the fact that tuberculosis is one of the commonest diseases. The faintest suspicion should lead us to apply a tuberculin test and a positive reaction should in turn call for x-ray examination. In no other way can we bring to light latent tuberculosis. Surveys of the adolescent and young adult population must be undertaken. Radiographing all young individuals who react positively to tuberculin is an expensive procedure but is less costly to the State and to the individual than the treatment of advanced tuberculosis.

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3. The Provincial Tuberculosis Program in Ontario

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THE Government's entrance into anti-tuberculosis work might be said to date from 1895 when statutory aid toward the cost of hospitalization of persons suffering from tuberculosis was first given to municipalities and hospitals. Although the moneys voted were primarily for treatment it must not be overlooked that making possible the segregation of active open cases was at that time and still is the most influential factor in preventing the spread of this disease.

In 1908 regulations for the control of tuberculosis were passed under the Public Health Act. These regulations involved reporting by number all known cases of tuberculosis. With the exception of some of the larger cities little serious effort was made to control the disease. There was lack of concern on the part of the attending physicians in carrying out the regulatory requirements and there was often municipal indifference, sometimes bordering on callousness, to the proper hospitalization of known cases. These circumstances prompted the provincial authorities to assume a more active direction of a province-wide scheme of control.

The chief effort in any program is to decrease as far as possible the incidence of primary infection and, if such exists, of superadded infection. To bring this about, there must be facilities for (1) the discovery of all persons suffering from tuberculosis and the proper recording of information concerning these persons and for (2) the segregation and treatment of all those in need of such.

Having in mind the limited diagnostic facilities, except in some of the larger centres, and appreciating the extent to which the general practitioner in smaller and more remote centres was handicapped in confirming or outruling the presence of disease, the lack of examination of contacts was not surprising.

Recognizing that the attending physician must always be the chief agency in the discovery and proper disposition of the vast majority of those suffering from tuberculosis and that his co-operation is essential, the Department of Health in 1924 organized its first travelling diagnostic clinic for diseases of the lungs. The objects of the clinic were to assist physicians not in proximity to already established clinics, x-ray units or sanatoria, in the earlier diagnosis of tuberculosis; to make possible the examination of contacts or suspected cases and to educate both physicians and the public of the need of this; to determine the incidence of tuberculosis in the various districts of the province; and to make the municipalities tuberculosis-conscious.

Clinic centres have always been organized with the co-operation of the county or local medical society and, where no such organization exists, the practising physicians. The clinic staff has consisted of one or two physicians and an x-ray technician. All necessary diagnostic apparatus has been carried, including an x-ray unit capable of making satisfactory chest films.

No case has been admitted to the clinic unless referred by the family physician. No information has been given to the patient at the time of examination. When the clinic returns to its base, the x-ray films are interpreted and all data correlated. A report is then sent to the physician who has referred the case. This report includes history, physical findings, x-ray interpretation, a diagnosis if possible, and any recommendations thought to be of assistance. Any pulmonary case referred by a physician is examined by the clinic. This includes non-tuberculosis conditions of the lungs, definite cases of tuberculosis, suspected cases, and *contacts*. The importance of examining suspected cases and contacts has been continuously emphasized. Every effort has been made by the staff to have the physicians who refer cases feel free to attend the clinic during the examination of their patients.

The clinic work and associated activities increased to such an extent that in 1935 the clinic branch of the service was made a separate division of the Department of Health and the personnel was more than doubled. The policy of decentralization of work was therefore made possible.

At the beginning of 1936 there were three clinic units in operation: one with its base at Ottawa serving centres in Eastern Ontario; one working out from Belleville, visiting centres in mid-eastern Ontario; and the central clinic working out of Toronto and visiting the south-western and north-western sections of Ontario not provided with clinic facilities. In June, 1936, a new clinic with headquarters at North Bay began operation, travelling north and west. The result has been that during 1936 forty new clinic centres were established and a total of one hundred and thirteen clinics held. During the eleven years of operation forty thousand persons have passed through the clinics. In 1936 nine thousand examinations were made.

In order that as many contacts as possible may be referred for examination, the following procedure is followed. The sanatoria and hospitals notify the central office of all patients admitted and discharged, together with their contacts. The Registrar-General's Department forwards the names from the death certificates when tuberculosis in any form is mentioned as a primary or contributory factor. The Provincial Laboratories report the name and address of every person whose sputum is found to contain tubercle bacilli. It is now required that all cases of tuberculosis be reported to the Department by name, together with such information as is deemed necessary. In each of the above instances the name and address of the attending physician are given. Approximately three weeks before the clinic visit all this information is sent to each physician concerned within the area.

The results following this emphasis on the importance of the examination of contacts have been encouraging in that in 1935 54 per cent. and in 1936 53 per cent. of newly discovered cases (excluding the childhood type) had disease in the minimal stage, as compared with approximately 40 per cent. in the early years of the travelling-clinic work. In 1936 72 per cent. of new cases discovered (all types) gave a history of contact. Of those newly discovered cases classified as minimal, 50 per cent. were referred because of contact only and gave no history of symptoms suggestive of disease. Of those newly-discovered cases classified as moderately advanced 35 per cent. were referred because of contact

only and gave no history of symptoms suggestive of disease. Forty-seven per cent. of all newly discovered cases (all stages) in two clinics were referred solely on account of contact. These findings establish the value of contact examination in the absence of symptoms and show that one-third of those patients with moderately advanced disease were not conscious of ill-health.

Sanatorium Extension Clinics

The staffs of the various sanatoria conduct clinics in twenty-two centres in proximity to their locations, clinics being held at intervals varying from one week to one month. These clinics are under the auspices of the local boards of health or other agencies. These twenty-two clinics do not include those conducted by the sanatorium staffs in their nearby cities. With the exception of the Gage Institute, the Toronto clinics are conducted by the staffs of the hospitals. In all, 2,400 clinics are held and approximately 40,000 examinations made annually by these agencies.

Activities of the Division of Industrial Hygiene in Tuberculosis

Tuberculosis is one of the most important causes of mortality in the wage-earning section of the population. Its incidence in a given industry is affected by three factors: the use of certain materials such as those containing silica; employment due to natural selection wherein those in poor physique tend to gravitate to lighter trades, e.g., garment workers, boot and shoe makers; and the spread of infection due to close contact.

The Division of Industrial Hygiene conducts clinics among the workers of certain industries where it has been found that the incidence of tuberculosis is increased and appears to bear a direct relationship to certain conditions found within these industries. The results have been that many workmen with disease are discovered and placed under proper treatment. Others who have been in intimate contact are especially supervised by physicians appointed by the industries. There has been a growth of appreciation by industry of the importance of the health of the workers and the measures necessary to prevent disease or to discover disease in its early stage, thereby lessening costly prolonged treatment and absence from work. During the past years a decided increase has taken place in the number of plants employing medical and nursing services.

Co-operation with the Department of Education

During the last two years the Division of Tuberculosis Prevention has been given the responsibility of the tuberculin testing and the x-ray examinations in connection with the physical examination, conducted annually under the auspices of the Department of Education, of all candidates entering the eight Normal schools and the College of Education.

From our experience in the examination of candidates for the teaching profession and the number of known school teachers breaking down with tuberculosis apparently in the infective stage for some time, it would appear that some regulations should be made requiring regular examination of all teachers.

Co-operation with the Department of Welfare

The Division co-operates in the examination of families receiving Mother's Allowance because of the death of the father from tuberculosis.

Activities of the Division of Sanitary Engineering in the Control of Milk

The control of milk supplies creates a problem of real magnitude. Until recently there was in this province no provincial supervision of milk-distributing plants and consequently no uniformity of requirements. Last year Provincial regulations were adopted which not only established minimum provincial standards but required the approval by the Department of Health of all distributing plants, raw and pasteurized.

Ontario Mental Hospitals

The Department has on its staff two physicians especially trained to supervise all anti-tuberculosis work, both preventive and curative, of patients and staff of the Ontario Hospitals. The Department has a special tuberculosis unit for the segregation and treatment of all mental tuberculous patients at the Ontario Hospital, New Toronto.

Regulations respecting the Control of Tuberculosis among Nurses

During the last few years it has been realized that there is a higher incidence of morbidity and mortality among undergraduate and graduate nurses than in the same age-groups in other occupations and the general population.

In an effort to control this problem, regulations were passed in 1935 making compulsory periodic tuberculin testing and x-ray examination of all nurses employed in hospitals in the province.

From an incomplete survey of nurses employed in public hospitals in the province it was found that three times as many graduate nurses as undergraduates were suffering from tuberculous disease. It would appear that the majority of nurses develop their disease after graduation. For this reason every nurse actively engaged in her profession should be required to furnish a certificate of freedom from active tuberculous disease, or rather, that she is non-infective, when applying for registration certificate.

Assistance in Admitting and Discharging Patients

Weekly reports are made by each sanatorium of the number of empty beds or the number of patients on the waiting list and this information is given physicians wishing patients admitted for treatment.

For those patients who have received the maximum benefit from sanatorium treatment and are ready for discharge but whose home conditions are not suitable for their return, the Department of Health, co-operating with the Department of Welfare and the municipalities concerned, seeks to establish suitable conditions in order that discharge may be brought about.

Facilities for Treatment

From knowledge gained from the clinic service as to the incidence of disease and information from the Registrar-General's Department regarding

the mortality, the attention of local authorities is drawn to the need of sanatorium accommodation within their districts. The government has from time to time given monetary assistance toward the establishment or extension of sanatoria. Government assistance has made possible during the last two years the building of the Fort William Sanatorium, as well as the St. Lawrence Sanatorium near Cornwall which is now under construction.

It would appear that in some sections of the province there are sufficient beds for the tuberculous. However, if all those in need of treatment were known and could be placed in institutions, there is reason to believe the existing accommodation in some sanatoria would be overtaxed and the need of further building made evident.

In all sanatoria and in most of what might be described as permanent or stationary clinics, pneumothorax refills on ex-sanatorium cases are carried out. Some of our travelling physicians, as well as a considerable number of physicians in outlying centres, are doing this work. However, there is still a shortage of pneumothorax facilities throughout the province.

After-care and Re-establishment

Much remains to be done in the matter of after-care and re-establishment. There is unfortunately no organized system of after-care of patients leaving sanatoria other than that of periodic examination.

The Samaritan Clubs of Toronto and Hamilton are successful in re-establishing a comparatively small number of selected patients in industry. The advisability of the establishing of some type of colony system for the discharged patient and family has been considered. The wide-spread nature of the province and the late industrial depression has postponed action leading to the setting up of such a scheme. Mother's Allowance is continued to the families of men unable to work when discharged from sanatoria. To single men and women who are unable to work following discharge extra relief is given.

In conclusion I would like to say that the Department is very earnest in its desire to lessen the contribution made by tuberculosis to human and economic wastage. In any widespread system of control the wholehearted co-operation of physicians, voluntary agencies, hospitals, industry and the public is necessary.

Discussion

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THE death rate from tuberculosis in Canada in 1935 was 60.3. Only four of the provinces had a lower rate than this; viz., Saskatchewan, 27.8; Ontario, 36.2; Alberta, 42.2; and Manitoba, 58.5. When it is remembered that in 1900 the death rate in Ontario was 160 it will be admitted that substantial progress has been made. There is no doubt that there is an irreducible minimum beyond which it will not be possible to bring about any reduction but there are few who will claim that that minimum has yet been reached.

Moreover, everyone recognizes that in any campaign it is the last ten or twenty per cent. of the objective that is the most difficult to obtain. If the death rate of 1900 is to be reduced by 90 per cent., a figure of 16 must be the aim. To accomplish this several new activities seem to be indicated.

The Contribution of the General Practitioner

To-day, as heretofore, one of the chief factors in the early diagnosis of tuberculosis is the work of the general practitioners. One desires to pay tribute to the part they have taken in the reduction to date. They still have a very important part to play because, as a rule, they are the first to be consulted by the patient.

In this connection it is to be emphasized that our ideas about the relative value of the different diagnostic procedures have been very definitely altered, and it would seem to be desirable that all general practitioners put into operation these more modern relative valuations. The five procedures in common use are the history, the clinical picture, the examination of the sputum, the x-ray film, and the tuberculin test.

If these are to be arranged in the order of their relative value in the diagnosis of early tuberculosis in people under thirty years of age, the sequence would be:

(1) Intracutaneous tuberculin test.
(2) X-ray film.
(3) Examination of sputum.
(4) History.
(5) Physical signs.

The reasons for such a sequence may be stated thus:

(1) *The Intracutaneous Tuberculin Test.*—This test, if negative to an adequate dose, eliminates those who have not yet been infected by the tubercle bacillus. Only the positive cases need further consideration. It is to be noted that now a considerable number of persons twenty or twenty-five years of age are found to be negative reactors to this test.

(2) *The X-Ray Film.*—An adequate x-ray film of those with a positive tuberculin reaction will show in the majority of cases (1) those who have no more than a primary healed lesion and (2) those that have a secondary lesion of some type. Only those in the second group require further consideration, except that any of group (1) showing any suspicious symptoms or having had intensive exposure had better be included with group (2).

It is to be noted that some cases, without symptoms or physical signs, may show a lesion on the film—and in these, serial films, at two or three-month intervals, are of the greatest value in determining those that have a progressive or retrogressive lesion from those that have a lesion that is stationary.

(3) *The Sputum Examination.*—When sputum is available this procedure is always of value. All methods should, however, be used—smear, concentration, incubation, and inoculation. Moreover, many samples, at least ten or twelve, should be examined.

(4) *The History.*—This is still important because it may give a clue to disease in other members of the family, or in other contacts, or in the previous illnesses of the individual.

(5) *The Physical Examination.*—This should, of course, never be omitted—but it needs only to be remembered that there must be a considerable degree of pathology before evidence can be found from abnormal physical signs. Usually the cases in which these are present are no longer early cases.

How frequently do examiners proceed in just the reverse order? It is not the sequence in which these procedures are used that is of importance. Often it is, of course, more tactful to let the patient tell the story first, do the physical examination next before proceeding to use the other methods. How often does the examiner stop at this point? How often, for one reason or another, does the examiner neglect to have samples of sputum thoroughly investigated? How often, further, is an x-ray film omitted—and how often is the tuberculin test not thought of at all?

The importance of the proper sequence in the valuation of evidence is what is to be emphasized, and it would appear that if the proper relative values of the different procedures were generally recognized and used, a larger number of earlier cases would be diagnosed and there would be found to be a greater interest and confidence on the part of the examiner.

Early Treatment

It is recognized also that the sooner a patient is put under proper treatment the better are the results likely to be. It is recognized, of course, that disinclination on the part of patients or of municipalities to undertake the expenditure of money very often causes patients to be deprived of early treatment. Some believe that if free treatment could be made available, as in Saskatchewan, Alberta and some other places, this deterring factor would be removed. The results obtained where such a method is in vogue seem to indicate that more of the earlier cases would receive treatment and that the results obtained would be better, and at a lower cost ultimately.

After-Care

There is also another consideration worthy of attention. The after-care of the discharged patient has been much neglected. Some means should be devised whereby the discharged patient should be given, when necessary, financial assistance, so that the degree of healing attained under treatment may be preserved. To do otherwise is uneconomical in that it tends to destroy results already secured at considerable cost—and in many cases necessitates further treatment under less favorable circumstances as to prognosis.

Some such program is worthy of consideration if it is hoped further to reduce the death rate in Ontario to anything like the figure of 16. In such a program the general practitioner has an important part to play; the municipality has an interest in that costs would be lower ultimately; and the patient has everything to gain in that there would be a better chance for getting well and a greater likelihood of remaining well.

Amendments to Canadian Maritime Quarantine Regulations

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IN June last, the writer presented a paper[1] on the subject of maritime quarantine in Canada, at the annual Conference of the State and Provincial Health Authorities of North America, which was held at Vancouver, in which the following recommendations were made:

(1) That quarantine inspection be confined to vessels that report quarantinable disease on board or have had such disease on board during the voyage, or have come from an infected port so declared in the official list;
(2) That vessels be boarded at the dock and not in the stream as at present. An exception may be made in regard to the latter only where boarding in the stream expedites quarantine procedure;
(3) That the large, expensive, unwieldly and unnecessary quarantine stations be abandoned, substituting therefor small, modern units consisting of detention quarters for not more than one hundred persons and a hospital unit on the cubicle system of half a dozen beds;
(4) That deratization requirements as laid down in the Convention of Paris of 1926 be adhered to;
(5) That laboratory facilities for bacteriological examinations be made by arrangement with the port health authorities.

These recommendations were approved by resolution by the State and Provincial Health Authorities and the Canadian Public Health Association. Subsequently, the Canadian Quarantine Regulations were amended in respect of recommendations (1) and (2).

In order to grasp the significance of the amendments, it is essential that one should have some knowledge of Canadian quarantine history and of quarantine procedure.

Quarantinable diseases were introduced into Canada at a very early date. This is attested by an epidemic of smallpox among French and Indians as early as 1635, and the widespread epidemic of typhus in 1659, which was brought to Quebec by a vessel named the *Saint André*. Referring to the arrival of vessels in Quebec in the latter year, we find that "the last vessels of the season were infected with malignant and contagious disease . . . . almost the whole country was infected"; and in 1664, "there were no diseases except those which were brought by the King's vessels. There died a hundred of those who disembarked." In the following year, a flotilla of vessels, all of which were in-

[1] *Future of Maritime Quarantine in Canada. Am. J. Pub. Health, 1936, 26: 1014.*

fected, arrived at Quebec. From one of them, *La Justice,* more than a hundred sick were disembarked.

What measures, if any, were taken in regard to the prevention of the entrance of diseases into the country at that time we do not know, but in 1710 there is this reference to medical inspection of vessels:

> In the year 1710 a vessel named the *Belle Brune* arrived here (Quebec) coming from the Islands (West Indies). We suspected it of being infected with plague because four or five men were dead in less than twenty-four hours. We sent them surgeons to visit the sick and who, being satisfied that there was no danger to the community, they were permitted to disembark and we received from the ship many sick in our hospital.

It was not until 1721 that quarantine was imposed by official enactment. In the preceding year, plague existed in epidemic form at Marseilles, thirty thousand dying of the disease, and as there was a considerable amount of communication by vessels between that port and Quebec, the introduction of that disease into the country was not improbable. This induced Vaudreuil, the Governor, and Begon, the Intendant, to impose the following quarantine regulations:

> Captains or masters of vessels, bark or brigantine, from all Mediterranean Ports or which touched there, shall anchor in the stream off Isle aux Coudres. There, those who have cannon or swivel-guns shall fire three shots a quarter of an hour apart.
>
> Those who have no cannon nor swivel-guns shall fire three musket shots, also at an interval of a quarter of an hour apart.
>
> One shall also fly the distress signal. The same signal shall be repeated at intervals of two hours until such time as those whose duty it is to board the vessels will be cognizant of their arrival.

It was forbidden to send small boats ashore, or to permit any member of the crew or passenger to disembark and communicate with any inhabitant of the colony. Corporal punishment was provided for the captain, master and those who went ashore. It was strictly forbidden to discharge cargo. An order was in force to burn any such cargo on the spot where found without further formality or juridical procedure.

In 1761 an Act to prevent the spreading of distempers was passed requiring all vessels with any plague, smallpox, malignant fever or other contagious distemper to anchor two miles below Halifax, and in 1795 an Act to compel vessels from infected places to undergo quarantine to prevent the communication of disease to Lower Canada became law.

To prevent the introduction of cholera, which was epidemic in Britain and on the Continent, "An Act to establish Boards of Health within this Province" (Lower Canada) was put into effect in 1832, by the establishment of a quarantine station at Grosse Isle in the St. Lawrence, situated twenty-seven miles below Quebec.

At this time quarantine enactments were formulated in New Brunswick, Prince Edward Island and Nova Scotia for the same purpose.

In spite of these measures cholera was introduced into the country and became epidemic. There were epidemics of cholera in Canada in the years

1832, 1834, 1849, 1851 and 1854. Typhus was introduced and became epidemic in 1847 and 1848.

With the exception of influenza, which was communicated to the people of Canada by vessels in 1918, causing thirty thousand deaths, these are the only occasions since the adoption of quarantine that quarantinable diseases, brought into the country by vessels, became epidemic.

Following the confederation of the provinces in 1867, the Dominion accepted responsibility for quarantine and a number of quarantine stations were established. Some of these have since been abolished. There are at the present time four, namely, William Head, B.C.; Grosse Isle, P.Q.; Partridge Island, N.B.; and Lawlor's Island, N.S. All vessels entering Canada, with the exception of those plying exclusively between the United States and Canada and between the French Islands, St. Pierre and Miquelon, and Canada, are obliged to drop anchor and undergo quarantine inspection at one of these stations. At all other maritime ports and at inland ports the Customs Officer acts as the quarantine officer. Should a case of quarantinable disease be discovered on board a vessel at one of the latter, the Customs Officer calls a physician and the necessary quarantine measures are adopted.

Each of the above-mentioned quarantine stations is equipped with qualified trained personnel, a quarantine boat for the purpose of boarding vessels, a disinfection plant, detention buildings for contacts, a hospital and dwellings for personnel. The total hospital bed-capacity of the combined stations is 241 and the detention bed-capacity 1,946.

A RECONSIDERATION OF MARITIME QUARANTINE

Prior to the adoption of the Articles of the International Sanitary Convention of Paris of 1926, quarantinable disease included all communicable diseases. Under the "Convention" it comprises only five, viz.: plague, cholera, yellow fever, typhus and smallpox.

Article 14 of the Convention requires that Signatories to the Convention maintain in their large ports and their surroundings sanitary services capable of applying the prophylactic measures laid down in connection with the quarantinable diseases above-mentioned and, in addition, the Signatories are obliged to supply at least once a year to the International Office a statement of their sanitary organization. The Convention lays down the sanitary procedures to be followed in dealing with the quarantinable diseases when they are found aboard ship.

Article 15 states that any ship, whatever its port of departure, *may* be subjected by the sanitary authority to medical inspection. It is not therefore obligatory to conduct a routine inspection of ships arriving at a maritime port, although that is now the practice. That much of this routine inspection is wasteful of time and effort, expensive and unnecessary, is well known to quarantine officials.

Having in mind the adoption of modern public health services by most civilized countries, full and complete knowledge of the cause, mode of spread

and methods of control of the quarantinable diseases, we are forced to the conclusion that the probability of their introduction and wide dissemination throughout the country is negligible.

There is no conclusive evidence to show that plague ever found its way into the country, but deratization measures to which all vessels are now subjected in all world ports reduce the probability of its introduction to a minimum.

Cholera has not been found on board a vessel in a Canadian port since 1871. The provision of water from a certified source for vessels in world ports has made vessel-borne cholera practically a thing of the past. The presence of cholera in a community to-day would not occasion alarm in view of the fact that practically all cities are possessed of modern filtration plants and water carriage systems.

Since the disappearance of sailing ships, yellow fever has practically ceased to be conveyed by shipping. It is only rarely that one hears of its occurrence on board ship and then only under exceptional circumstances.

The last occasion when typhus was detected on board a vessel destined to Canada was in 1915, and as all immigrants from the Continent of Europe are now subject to delousing before embarkation for Canada, it may be placed in the same category as plague, cholera and yellow fever in so far as its introduction into the country is concerned.

Smallpox is occasionally found on board vessels proceeding to Canada, and we must be constantly on guard against it. This refers particularly to vessels plying between the Orient and Pacific ports. Whereas it is only exceptionally that smallpox is detected on board vessels entering the Atlantic ports—Saint John, 1922, Quebec, 1927, Halifax, 1929—it is found almost annually on vessels entering Pacific ports. Our chief concern is not with the fact that a case of smallpox may be found on board a vessel, but the large number of unvaccinated people throughout the country, who provide fuel for an epidemic. As passengers coming from districts where smallpox has prevailed in epidemic form within fourteen days prior to sailing must be vaccinated before entering Canada, the occurrence of smallpox among them is infrequent. It is almost exclusively among the personnel of vessels that smallpox is found.

Park, in discussing quarantine in his "Public Health and Hygiene", published in 1928, has this to say:

> The discoveries of the modes of transmission of yellow fever, typhus fever and plague, and the development of public health activities by the Government, the states, cities and counties, all tend to minimize the necessity of doing more along purely maritime quarantine lines than to regard it as a palliative measure which is declining in importance in almost exact proportion to the effectiveness of public health measures in the ports of the world.
>
> Whenever a proper spirit of effective co-operation can be brought about on a permanent basis, wherein the Governments, port authorities and shipping interests will unite on both business and public health principles to abolish maritime quarantine, except under extraordinary circumstances, such as epidemics or war conditions, the ordinary quarantine station, as we know it, need not be maintained.

AMENDMENT OF CANADIAN QUARANTINE REGULATIONS, 1937

The Canadian Quarantine Regulations were amended by Order in Council as follows:

Vessels from Outside of Canada

7. (a) Every vessel arriving from a port outside of Canada, other than those coming within the category enumerated in Section 13 of these Regulations, bound for a port of Canada having an organized quarantine station, shall be inspected by the Quarantine Officer at the place duly appointed for such inspection, and shall not be allowed to make Customs entry at any port in Canada until it has received pratique.

(b) Vessels bound for such ports as may from time to time be designated by the Department may submit to the Quarantine Officer by wireless, at the vessel's cost, information called for in such cases by the Department. The Quarantine Officer shall upon every such submission instruct the vessel to proceed to its port of destination or state to such vessel the place and time where and when it shall be subject to quarantine inspection. Any vessel proceeding without inspection or such instructions to proceed shall be held to have contravened these regulations.

(c) The Quarantine Officer shall, in every case of instructing a vessel to proceed without inspection, immediately notify the Customs Officer at the port of destination of such instruction. Such notification shall be either in writing or by telegram but if by telegram shall be duly confirmed to the Customs Officer by the Quarantine Officer in writing. The Customs Officer shall allow any vessel, the subject of such notification, to make customs entry without written pratique.

Port Bills of Health

10. The Department may, from time to time, designate any place outside of Canada as a place from which every vessel clearing for any port in Canada shall be required to obtain a bill of health endorsed by the official health authority for the place, setting forth the health conditions at such place, including a detailed statement covering the quarantinable diseases, and showing the number of cases of each such disease occurring during the fourteen days immediately preceding the day of sailing.

18. (c) The Department shall designate the hours between which wireless submissions as set forth in Section 7 may be received.

Quarantine Officer to satisfy Himself as to Health of Vessel

19. The Quarantine Officer shall satisfy himself as to the presence or absence of infectious diseases by personal inspection of those on board or by the sworn statement of the officer in charge of the vessel, on form Q.S.1, or by both, or from information obtained by wireless from the Officer in charge of the vessel, who shall duly confirm this information in writing on form Q.S.1.

Responsibility of Ships' Masters

78. Ships' masters or other ships' officials shall be liable to a penalty not exceeding $400.00 for any contravention of the foregoing Regulations, in respect to which no specific penalty is otherwise provided. A vessel shall be held liable for any pecuniary penalty imposed on its master or other officer.

Responsibility of Ships' Officers in Submitting Information

79. An officer in charge of a vessel or other official failing to answer with exact truth all questions, an answer to which is required by these regulations or contained in any form presented by the Department for completion by such officer or official, or submitting false information by wireless, shall be liable to a penalty not exceeding $200.00.

Briefly, the effect of the amended Quarantine Regulations will be that the Officer in charge of a vessel subject to quarantine will wireless the Quarantine Officer the state of the health of the vessel and the Quarantine Officer, if satisfied that there is no quarantinable disease on board the vessel, will instruct the vessel to proceed to its destination. The Quarantine Officer will notify the Collector of Customs by telegram, or in writing, that the vessel has satisfied the Quarantine Regulations and the Customs Officer will permit the vessel to make customs entry without written pratique. Subsequent to the vessel being docked, the Quarantine Officer will obtain confirmation of the vessel's wireless message in writing. The Quarantine Officer, if not satisfied as to the health of the vessel, will indicate to such vessel the place and time it will be subject to quarantine inspection.

For the present time, this procedure is being applied in its entirety at Atlantic Ports; and at Pacific Ports in the case of vessels from European Ports which have touched only at North American Ports. It is considered advisable to proceed cautiously and see how it works at Atlantic Ports before applying it fully at Pacific Ports, as the probability of the introduction of quarantinable disease, particularly of smallpox, by vessels plying between the Orient and Pacific Ports, is greater than in the case of those plying between European and Atlantic Ports. The deratization requirements laid down in the Convention of Paris will be adhered to.

Hitherto, all vessels entering the maritime ports of Canada were obliged to produce a Bill of Health. Now, only those coming from ports designated from time to time by the Department will be obliged to do so.

The end result of the amended regulations will be to expedite shipping without in any way limiting the powers of the Quarantine Officer or lessening the protection of the public. Incidentally, the Quarantine Officer will feel happier in the realization that he is bringing intelligence to bear upon his task.

In addition, it is the intention to gradually abolish Quarantine Stations which are situated on islands and substitute therefor small compact units on land in proximity to the large ports. Steps have already been taken in this direction.

The Incrimination of Milk and Milk Products in Staphylococcus Poisonings

Suggested Methods for the Investigation of Outbreaks

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WE have recently reported (1) the investigation of a small milk-borne epidemic of food poisoning in which there was little doubt that the toxic products of staphylococci in either the milk or ice cream consumed by the victims were the cause of the poisonings. Since that time we have had the opportunity to investigate carefully another outbreak of staphylococcus milk poisoning and to examine other samples of milk implicated in epidemics of food poisoning. The purpose of this report is to review our experiences in investigating milk-borne epidemics of food poisoning and in examining samples of milk implicated in cases of food poisoning. It is hoped that our experiences and those of others, to whose work we shall refer, may be of some assistance to those confronted with the problem of investigating similar outbreaks.

Milk Supply

All the outbreaks which we have studied have occurred as the result of consuming milk supplied by a small number of cows. The milk was "air cooled" or "cooled" in water that was not cold enough to inhibit bacterial growth. For this reason more outbreaks are to be expected during the warmer months. Milk that has caused illness was usually left to "cool" from 6 to 12 hours before being used. (Morning's milk used for supper and evening's milk used for breakfast and lunch.) There was thus ample time for considerable multiplication of microorganisms.

In taking samples, the milker's hands and cow's teats are thoroughly washed with hot water and soap, followed by a cleaning with 70 per cent. alcohol. Several streams of milk are discarded before the sample is collected. The reason for using every precaution to obtain a sample under aseptic conditions is obvious when it is remembered that staphylococci are ubiquitous and when they are found in large numbers in milk, there must be little or no doubt that they are derived directly from the udder, otherwise their significance is considerably minimized. Although staphylococci from a variety of sources (2) apparently can produce food poisoning and thus staphylococci getting into the milk from the air, water, dirty utensils, etc., might conceivably cause poisoning if allowed to multiply sufficiently, it has been our experience to find outbreaks of milk poisoning only where one or more of the cows producing the milk have a staphylococcus mastitis. In the outbreak described by Crabtree and Lit-

terer (3) two of the thirteen cows supplying the milk had a staphylococcus mastitis. It may be that staphylococci leading a parasitic existence are more capable of producing an enterotoxin than those leading a saprophytic existence.

Needless to say the milk samples must be immediately placed in an iced container after being collected and kept there until the examination is made if any significance is to be attached to the number of organisms present. Where a large number of staphylococci are found in the agar pour plates and no other types of organisms are present (a pure culture of 70,000 staphylococci per cc. was found in the milk of one cow we examined), there is considerable assurance that these organisms came directly from the udder.

When investigating epidemics of food poisoning suspected of being milk-borne, we have made a few simple field tests for mastitis on the cows supplying the milk. Palpation of the udder, passing the milk through a fine wire mesh (strip cup) or black cloth, and the bromthymol-blue tests are a few of the field tests that are easily and quickly carried out. Many other chemical, microscopic and bacteriological field and laboratory tests (4, 5) may be performed if time and facilities permit.

Much has been written and said about streptococcus mastitis but apparently little consideration has been given to staphylococcus mastitis because it was thought to be rare. However, the recent paper of Gwatkin et al (6) indicates that staphylococcus mastitis may be more prevalent than formerly supposed. These workers point out the potential public health importance of these infections and we believe that future study will indeed reveal an unsuspected number of udder infections which have caused illness.

In our experience the milk consumed by food-poisoning victims has never appeared abnormal to them in appearance, odor or flavor despite the fact that a field and laboratory examination indicated that the cows supplying the milk had a staphylococcus mastitis. Butter, cheese, etc., made from the mastitis milk also did not appear to be abnormal by organoleptic tests.

EPIDEMIOLOGICAL CONSIDERATIONS

As far as we know, outbreaks of staphylococcus milk poisoning have not been traced to milk supplied by large dairies in the cities. The reason for this is probably that the dilution factor reduces the quantity of any enterotoxin produced by staphylococci which might be in the milk to such an extent that it becomes innocuous. Pasteurization would probably not cause an appreciable destruction of any enterotoxin present since it is relatively heat stable (7).

In investigating outbreaks of food poisoning, the usual procedure of obtaining a list of the foods eaten by the victims, time when first symptoms were noted, etc., should be followed. Our findings have been entirely in accord with Jordan's (2) statement that in staphylococcus food poisonings the onset of symptoms follows from two to four hours after eating the foods containing the enterotoxin. This relatively short incubation period seems to be a very valuable clue in distinguishing staphylococcus food poisoning from Salmonella

poisonings where the incubation period usually is not less than six hours and may be from twenty-four to seventy-two hours.

It is not uncommon to encounter persons who are apparently entirely unaffected by drinking milk which contains the staphylococcus enterotoxin and which causes violent gastro-intestinal symptoms in others consuming the same milk at the same meal. This circumstance often throws the investigator off the track in tracing the offending food. In this connection it should be remembered that individuals seem to differ greatly in their susceptibility to the enterotoxin as the feeding of sandwiches contaminated with staphylococci to human volunteers has proved (7). We have also come across persons who have apparently developed an immunity or tolerance to the enterotoxin, for though they give a history of having had several previous gastro-intestinal attacks, they have subsequently not had any similar trouble despite the fact that they have continued to consume the same milk (from cows with mastitis) that made other friends and visitors sick the first time they drank it. These observations are substantiated by the experimental work of Woolpert and Dack (8) and Dack et al (9) who found it possible to produce some degree of tolerance or immunity to the enterotoxin in man and monkeys by repeated feeding of the toxic substance.

We have investigated several outbreaks of milk sickness due to the drinking of milk from cows which had eaten white snake-root. Since both snake-root and staphylococcus poisoning produce similar gastro-intestinal symptoms (nausea, cramps, vomiting and diarrhoea), care must be taken to distinguish these two types of poisoning. As a rule, snake-root poisoning has a slow insidious onset with a marked muscular weakness lasting several days. In some cases cardiac damage occurs which may prove fatal. On the other hand, victims of staphylococcus poisoning have a rapid onset of symptoms and usually show a complete recovery within 24 hours after the onset of acute symptoms.

BACTERIOLOGICAL CONSIDERATIONS

Our examination of milk implicated in cases of food poisoning consists of a total plate count on nutrient agar and a streaking on blood agar and Endo medium. A direct smear (or a Breed count) is made from the milk samples and stained with Loeffler's methylene blue to determine the relative number of leucocytes and bacteria present. The milk is incubated 24 hours at 37°C. in the original sample bottle and again examined microscopically.

For the purpose of detecting a possible Salmonella food poisoning, we try to obtain faecal specimens from as many of the victims as possible. These specimens are streaked on Endo, eosin-methylene blue, Wilson and Blair and MacConkey's media. Whenever possible we also obtain a five cc. specimen of blood from the victims for detecting agglutinins of food poisoning organisms. If possible, any foods which the history of the outbreak implicates are obtained for examination.

If large numbers of staphylococci are found in the milk samples the ques-

tion naturally arises—are these organisms capable of producing a potent enterotoxin? Unfortunately there are at present no generally recognized simple laboratory tests to determine what strains of staphylococci are capable of producing food poisoning.

Identification of Enterotoxic Staphylococci

Stritar and Jordan (10) were unable to find any cultural, biochemical or serological tests which would distinguish food poisoning strains from other strains of staphylococci. Stone (11) has reported that food poisoning strains of staphylococci can be identified by their ability to liquefy a specially prepared gelatin medium. Dolman and his co-workers (12) have recently found that enterotoxin-producing strains of staphylococci can be detected by injecting kittens with specially prepared filtrates of these strains. It is interesting to note that strains of staphylococci which Dolman (12, 13) found to produce a potent enterotoxin, gave a negative test on Stone's medium.

Until the reliability of the cultural methods of Stone and the kitten-feeding method of Dolman have been amply confirmed the only method at present of determining whether or not a given strain of staphylococcus can produce food poisoning is by growing it under conditions (8) which favor the production of the enterotoxin and feeding the sterile filtrate of the culture to monkeys or human volunteers. In the experience of Dack* and ourselves, monkeys have not proved very satisfactory for detecting staphylococcus enterotoxin since their susceptibility apparently varies from time to time. For example, on one occasion we fed forty cc. of a staphylococcus filtrate to each of seven monkeys (two of which had been previously found susceptible to the enterotoxin) and at the same time one cc. of the same filtrate was taken by a human volunteer weighing over 200 pounds. Within four hours the volunteer was extremely sick with all of the usual food poisoning symptoms, yet not one of the monkeys ever showed any evidence of illness.

The mechanism of vomiting in the monkey is apparently not as sensitive as that of other mammals possessing a vomiting centre, for we have injected subcutaneously from .004 to 0.1 grains of apomorphine (i.e., up to ten times the human emetic dose per kilogram of weight) into two and three kilogram monkeys and have never been able to make them vomit. Larger doses were not used because the hyper-excitability of the monkeys indicated that the emetic dose had been exceeded and the toxic dose reached.

In our previous report (1) we were unable to detect agglutinins for staphylococci (isolated from the implicated milk) in the sera of any of four persons who had been poisoned. However, in a recent epidemic we obtained a four-plus agglutination in a titre of 1:80 with two of the four strains of staphylococci isolated from the incriminated milk. (These strains were not agglutinated by the sera of ten other persons not involved in the epidemic.) The serum was obtained from a farmer who had experienced several gastro-intestinal upsets two to three months previously, but who had not developed

**Personal communication.*

any subsequent food poisoning symptoms even though he had continued to drink the same milk that made others sick when they first drank it. It will be recalled that Barber (14) found an agglutination titre of 1:40 in his own serum for the strain of staphylococcus which had apparently caused his series of food poisonings. Agglutinins for staphylococci in persons who have experienced food poisoning is suggestive evidence of the cause of their illness. A more direct immunological proof would be the demonstration of a specific anti-enterotoxin for staphylococci in their blood. The technical difficulties in carrying out such a procedure are illustrated by the work of Woolpert and Dack (7).

It is obvious that for the average small laboratory it is impracticable to carry out all of the above-mentioned cultural work and feeding experiments now considered necessary, pending confirmation of the work of Stone and Dolman, in order to determine whether or not staphylococci isolated from milk or other foods are capable of producing an enterotoxin. However, if a large number of staphylococci in practically pure culture are found in the incriminated milk and other microscopic and chemical tests indicate that one or more of the cows supplying the milk has mastitis; and the epidemiological evidence and clinical symptoms point to a milk-borne staphylococcus poisoning, it is believed that this presumptive evidence is strong enough to warrant the diagnosis of a staphylococcus milk-poisoning and the elimination of the infected cows from the herd.

SUMMARY

The experience obtained through the investigation of several outbreaks of staphylococcus milk-poisoning has been presented in the hope that it will be of some assistance to those investigating similar outbreaks.

In each outbreak of staphylococcus milk-poisoning that we have investigated, cows with staphylococcus mastitis have been detected in the herd supplying the milk. This suggests that parasitic staphylococci may be more capable of producing an enterotoxin than saprophytic staphylococci.

In investigating outbreaks of staphylococcus milk-poisoning some persons who appear to be naturally insusceptible and others who seem to have become immunized to the staphylococcus enterotoxin have been encountered. These findings may mislead the investigator in tracing the offending food. In localities where milk sickness, caused by white snake-root, occurs, the investigator must be careful to distinguish this type of poisoning from staphylococcus milk-poisoning.

The most reliable method at the present time for detecting food-poisoning strains of staphylococci is to culture suspected strains under conditions favorable for the production of the enterotoxin and feed the sterile filtrate of the cultures to human volunteers—*with due precautions.* When such a procedure is not practicable and the presence of large numbers of staphylococci in the milk from cows which chemical and microscopic tests indicate have a mastitis infection and the epidemiological and clinical findings point to a staphylococcus

poisoning, it is considered that these findings constitute sufficient presumptive evidence for the diagnosis of staphylococcus milk-poisoning and warrant the elimination of the infected animals from the herd.

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Legal Responsibility of a Medical Officer of Health*

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THE office of medical officer of health is statutory: it is a creation of the legislature. In contrast, the office of coroner existed long before it received statutory recognition. This is of some importance, for the coroner may have certain powers and duties outside those defined in the statute, derived from the ancient prerogatives pertaining to the office. Not so the medical officer of health: his powers and duties are those conferred by the legislature and none other. When some question arises, such as the medical officer's right to deal with pollution of a water supply, it is a matter of finding out what the Act says—and that is the end of it.

The Acts which concern the medical officer of health are chiefly The Public Health Act and any regulations or municipal by-laws pursuant thereto, The Venereal Diseases Prevention Act, and any by-laws under The Municipal Act. There are some additional Acts dealing with health matters about which people will naturally look to the medical officer of health as a source of information: The Public Hospitals Act, The Sanatoria for Consumptives Act, and The Mental Hospitals Act. Some reference, necessarily inadequate, will be made to these various statutes.

Appointment of the Medical Officer

The appointment of a medical officer of health is dealt with in section 34 of The Public Health Act. It may be noted that it is compulsory for every municipality to appoint a medical officer of health, and on default the Lieutenant-Governor in Council may make the appointment. Section 36 provides that the medical officer of health cannot be removed from office except on a two-thirds vote of council and with the consent of the Minister. Also in subsection (2) the Department may dismiss a medical officer of health for neglect of duty. The Act also makes provision for filling a vacancy (s.40), appointment of a temporary officer (40 (2)) and appointment of an additional officer.

A medical officer should see the by-law appointing him and make sure that it fulfils the requirements of the Act. For example, the appointment should be for an unlimited term, and should not be made annually.

A word may be said about salary (see section 38). The salary is fixed by by-law and is the officer's total remuneration for his services as medical officer of health. The practice of paying a medical officer of health a nominal

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salary and additional remuneration from time to time for services rendered is quite out of keeping with the Act.

Section 37 defines in a general way the responsibility of the medical officer of health:

"Every medical officer of health shall be the executive officer of the local board, and with the local board shall be responsible for the carrying out of the provisions of this Act, and of the regulations, and of the public health or sanitary by-laws of the municipality."

Enforcement of the Public Health Act

The procedure for the enforcement of The Public Health Act is by summary conviction in magistrate's court (section 112). This is the method to be employed in the event of a breach of the Act or regulations. In taking action to abate a nuisance, certain preliminary formalities are required, such as service of notice (sections 76 to 83).

It should be remembered that the enforcement of health legislation is analagous to a criminal prosecution: it is an action brought by the Crown for the public good. It is not an action to remedy a private wrong or grievance. It may happen that, in addition to the prosecution under The Public Health Act, there may also be a private action brought by one party against another. For example, a man who maintains on his property a certain thing which is dangerous to health may be prosecuted under The Public Health Act for keeping a nuisance. But the same man may be sued by his neighbor in a civil action for damages. The law as to what constitutes a nuisance is not the same in the two cases. For example, noise is probably not a nuisance within section 73 of The Public Health Act, but it has been held to be a nuisance in certain cases in a civil action by a plaintiff to recover damages.

A medical officer of health who exceeds his authority may be mulcted in damages by any person who is wronged thereby. The following section (37a) of The Public Health Act, enacted by 1934, c.47, s.6, is an example:

"No action, prosecution or other proceeding shall be brought or be instituted against a medical officer of health for an act done in pursuance or execution or intended execution of any statutory or other public duty or authority, or in respect of any alleged neglect of default in the execution of any such duty or authority without the consent of the Minister of Health."

It will be seen that this section affords some protection to the medical officer of health.

The medical officer of health, then, has not only the right but also the duty to enforce the provisions of The Public Health Act, the regulations, and municipal health by-laws.

It would be far beyond the limitations of these few remarks to depict in their entirety the various health measures laid down in the Act and regulations. We must be content to select a few of the provisions, particularly those whose interpretation has presented difficulty from time to time.

Nuisances

The question whether a certain condition constitutes a nuisance under The Public Health Act is one which arises rather frequently. To determine whether a condition is a nuisance, look first at section 74. If the condition is one that is listed in that section, the question is determined at once—the condition is a nuisance. If the condition is not listed in section 74, then one must determine whether it comes within section 73, which reads as follows:

"Any condition existing in any locality which is or may become injurious or dangerous to health or prevent or hinder in any manner the suppression of disease shall be deemed a nuisance within the meaning of this Act."

As an example, let us suppose that Mr. A. comes to the medical officer of health and complains that some weeks previous a certain factory has been erected near Mr. A.'s residence. In this factory is a mechanical hammer which in its operation causes a great deal of noise which is disturbing Mr. A. and his neighbors. Mr. A. wants the medical officer of health to put a stop to the noise. Is the noise a nuisance under the Act? It is not listed in section 74, so it is a question whether the noise "is or may become injurious or dangerous to health" (section 73). The medical officer of health must decide what medical men in general would say on this point. Unless the medical officer can say that the noise is or may become injurious or dangerous to health, he should inform Mr. A. that it is not a matter in which the health authorities can interfere. Mr. A. may still have a private right of action against the person operating the factory—but that is a matter outside our concern.

It is not practicable or necessary to review the various conditions individually. Each case is to be decided on the foregoing principles.

Water Supply

Another matter of concern to the medical officer of health is pollution of water supply. There are two aspects: the measures which the medical officer of health may take to prevent pollution, and liability of the municipality in which the water supply is located.

In connection with the measures which a medical officer of health may take to prevent or deal with pollution of water supply, look at sections 90 to 94, especially 92 and 94. In these sections, certain things in relation to water supply are prohibited. It is not necessary to prove that the pollution is dangerous to health: it is sufficient to show that the pollution is liable to impair the safety, palatability or potability of the water supply. Under section 74, clause c, "any well, spring or other water supply injurious or dangerous to health" is a nuisance. These various sections make adequate provision for the medical officer of health to prevent or deal with pollution of water.

The liability of a municipality for damage caused by a polluted water supply has come before the courts on a number of occasions. This is noteworthy for the medical officer of health who is the person responsible for preventing such a condition.

The general principle is stated in 7 C.E.D. (Ont.) at p.965:

"A contaminated water supply is a public nuisance, and a municipality which knowingly maintains it is answerable in damages to all persons who suffer ill health or contract disease by drinking water from such source. But in an action of this nature there must be evidence from which it may be inferred that the disease was caused by drinking the contaminated water."

In the case of Campbell v. Kingsville reported in 37 O.W.N. 51 and more fully in (1929) 4 D.L.R. 772, the municipality was held liable for $2,000 damages for the death of a woman who contracted typhoid fever and died as the result of drinking the public water supply. Mr. Justice Raney held that the presence of typhoid bacilli may be inferred from physical conditions relating to the water supply, the known presence therein of other bacilli usually found therewith, etc. A similar conclusion was reached in Costanza v. Dominion Canners (1921) 51 O.L.R. 166 and 1923 S.C.R. 46. This is in keeping with modern scientific knowledge that it is not necessary or feasible to demonstrate typhoid bacilli in water to prove that such water is the cause of typhoid fever. In the case of McQueen v. City of Owen Sound, the Court of Appeal of Ontario (1927) 32 O.W.N. 383 seemed to stress the absence of evidence that typhoid bacilli were present in the water as a reason for dismissing the action. At page 38, the learned Chief Justice states "the action failed from the want of direct or indirect evidence that the water supplied to the plaintiff carried typhoid bacilli". It may be noted, however, that in this case also it may be inferred that indirect evidence of the presence of typhoid bacilli would be sufficient to convince the Court.

In the case of Beal v. Michigan Central R.R. Company 19 O.L.R. 502, Mr. Justice Riddell delivering the judgment of a Divisional Court makes reference at p.507 et seq. to some unreported cases as to the law that there must be evidence from which it can be fairly inferred, not simply guessed, that the damage was caused by the defendant.

Communicable Diseases

Passing to another aspect of the powers and duties of a medical officer of health, there is the oft-recurring problem of the isolation of persons suffering from communicable diseases.

The provisions made by the Legislature to prevent the spread of these diseases may be found in sections 48 to 72 of the Act, sections 31 to 34 of schedule B and also certain regulations.

In the case of Jack v. Cranston (1928) 35 O.W.N. 159 at p.161, the Chief Justice refers to quarantine in these words: "In causing to be affixed to the plaintiff's house a notice that smallpox was therein, he (the medical officer of health) was discharging an imperative and unqualified duty cast upon him by the statute."

You will notice that in several of the sections of the Act the word "shall" is used: as the Chief Justice has said the duty cast upon the medical officer of health is imperative and unqualified (e.g., sections 56, 57, 58).

There is difficulty in defining the powers of a medical officer of health in relation to a person suffering from tuberculosis.

If you will look at section 2 of The Regulations for the Control of Communicable Diseases, approved June 9, 1931, you will find that sections 57, 58 and 60 of the Act have not been made applicable to tuberculosis. These sections apply particularly to isolation of patients.

Tuberculosis

In the same set of regulations, however, you will find in section 40, twelve paragraphs applying specifically to tuberculosis. Paragraphs 4, 5 and 6 deal particularly with isolation of a tuberculous patient. The difficulties which arise in forcibly taking a person suffering from tuberculosis to hospital and keeping him in custody against his will are apparent. Sanatoria are not equipped to imprison such a person: and the procedure is virtually imprisonment. If un-cooperative cases of active tuberculosis are or become a menace to the health of others, it may be that some central institution for their compulsory detention would be supported by public opinion. As matters stand at present, the medical officer of health has no satisfactory legal procedure to deal with their isolation.

Provided, however, the patient will co-operate, the medical officer of health should have no difficulty in sending the patient to a sanatorium. Any sanatorium receiving provincial aid must admit any person in need of treatment: if the sanatorium has a vacancy and the patient is willing, there should be no difficulty in sending him to sanatorium at once.

Venereal Diseases

A word may be said about information which a medical officer of health receives or acquires in the course of dealing with patients under The Venereal Diseases Prevention Act, R.S.O. 1927, chap. 264. It is, of course, the general rule of law that a medical practitioner can be compelled to disclose, as a witness, relevant confidential information received in connection with professional services rendered to a patient. In Ontario, sections 9 and 11 of The Venereal Diseases Prevention Act seem to create an exception to the foregoing rule. These sections prohibit any person, including a physician, from disclosing the information specified in these sections. If a medical officer of health is served with a subpoena and in the witness box is asked to disclose information of this kind, he would be wise to point out to the presiding judge that the information is privileged under The Venereal Diseases Prevention Act, and ask the judge to rule whether he is to disclose the information.

Mental Disease

It is possible that a medical officer of health may be called upon from time to time to advise persons in his municipality as to the best course of dealing with a person suffering from a mental disease. The information required will

be found in The Mental Hospitals Act, 1935, chap. 39, a copy of which may be obtained by writing to the Department.

Four types of patient are dealt with under the Act: mentally ill, mentally defective, epileptic and habituate.

Mentally ill patients may be admitted to an Ontario Hospital in any one of the following ways:

(1) On a voluntary application by the patient himself (sections 19, 20).
(2) On the certificates of two medical practitioners accompanied by a history form and financial statement (sections 21, 22, 23).
(3) After a judicial inquiry by a magistrate on the warrant of the Deputy Minister of Hospitals (sections 26-31).
(4) Any person who is charged with any offence may be remanded by a magistrate or judge for 60 days' examination (section 36).
(5) Prisoners in reformatories, gaols, etc., may be transferred to an Ontario Hospital on the warrant of the Lieutenant-Governor (section 33).

In addition to the five methods outlined above, a mentally ill person may be sent to an Examination Unit on the certificate of one medical practitioner for a period not exceeding 30 days. During this stay of 30 days under observation, his mental condition will be determined and, if necessary, the patient can then be certificated by two medical practitioners and detained in the same manner as patients under clause 2 above (section 61).

Mentally defective patients are admitted in the same manner as mentally ill patients with the exception that a mentally defective person cannot make a voluntary application. There are, of course, separate forms for mentally defective patients containing the necessary changes in terminology.

Epileptic patients may be admitted by any of the six methods outlined for mentally ill patients. The forms for epileptic patients contain the necessary changes in terminology (sections 58, 59).

Habituate patients may be admitted in three possible ways:

(1) On a voluntary application (section 47).
(2) The friends or family of the habituate person may present a petition to a judge in chambers of the county or district court in which the alleged habitue resides. The judge conducts an inquiry to determine whether or not the person is an alcoholic or drug addict, and, if he is so found, he can be committed to an Ontario Hospital for a period not exceeding two years (sections 48-52).
(3) An habitue may be admitted to an Examination Unit or to an Ontario Hospital on the certificates of two medical practitioners for a period not exceeding 30 days. If necessary, a petition according to the provisions of paragraph 2 above may be presented and heard during this 30 days' detention (sections 53, 54).

B. Welchii as an Indicator of Pollution in Sanitary Surveys*

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FOR the last few years an annual sanitary survey of Burlington Bay has been made by the Hamilton City Engineer's Department. In 1936, in addition to the usual chemical and bacteriological examinations, the samples were examined for the presence of anaerobic sulphite-reducing bacteria.

The presence of this class of organisms as an indicator of pollution was suggested in 1924 by Wilson and Blair. Sulphite-reducing bacteria are numerous in the faeces of man and animals, and are absent in uncontaminated water. The majority of such bacteria found in water belong to the *B. welchii* species (1). Wilson and Blair in 1925 reported a satisfactory correlation between *B. coli* and *B. welchii* tests and considered that the presence of *B. welchii* in the absence of *B. coli* was evidence of more remote contamination (2).

The samples were examined in sulphite-glucose-iron agar using 10 cc. of water as a unit sample. Sulphite-reducing bacteria appear as deep black colonies due to the precipitation of ferrous sulphide.

TABLE I

Bacteriological Findings

Zone	Samples	Agar per 1 cc. (average)	*B. coli* per 1 cc. (average)	*B. welchii* per 1 cc. (average)
Industrial shore	78	190,000	12,000	13.9
Beach shore	51	24,000	340	2.9
North shore	42	7,600	10	1.1
West end	30	3,800	80	4.9
Desjardin Canal	23	730	550	7.5
Centre of Bay	27	24,000	24	1.6
Lake Ontario	72	365	1.1	.75

Table I presents a summary of the bacteriological findings in five zones in the bay, the Desjardin Canal, and Lake Ontario adjoining the bay. The findings of the three examinations in each zone show a definite correlation. On the industrial shore is located the disposal plant, as well as many storm and private sewers discharging sanitary, drainage, and industrial waste waters. The other three shores of the bay are relatively clean, being contaminated only when winds drive the water away from the industrial shore. The lake is contaminated by water drifting out through the Beach Canal. The Desjardin Canal, entering the bay, has very little flow of water and

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receives Dundas sewage at its upper end. It shows remarkably high *B. coli* and *B. welchii* counts, considering the low agar count.

When individual samples are considered, the correlation between the two tests is not quite so satisfactory. All the bay samples had a colon index of 1 per 1 cc. or higher, while only 41 per cent. had a *B. welchii* count of 1 per 10 cc. or more. Most of these negative *B. welchii* samples had a fairly high colon index. In the neighbourhood of the sewage disposal plant outfall, the colon index reached 100,000 per 1 cc., and *B. welchii* also reached its maximum there.

On one occasion a heavy rainfall thoroughly flushed out the sewers and on the sampling day following the rain, the *B. welchii* count increased from 5 to 24 per 10 cc. and the colon index from 4,000 to 25,000 per 1 cc. as compared with the previous samples.

In the lake, which is comparatively free from contamination, 31 per cent. of the samples had a colon index of 1 per 1 cc. or more, and 32 per cent. had a *B. welchii* count of 1 per 10 cc. or more. Since *B. welchii* is a spore-forming organism and more resistant to unfavourable conditions, it can be traced farther away from the sources of pollution. In the lake the relative number of *B. coli* as compared with *B. welchii* decreased greatly.

CONCLUSION

Sulphite-reducing anaerobes were found in contaminated waters in large numbers and in less contaminated waters in fewer numbers. They provide a useful indicator in tracing pollution in sanitary surveys.

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EDITORIAL SECTION

IMPORTANT CHANGES IN MARITIME QUARANTINE

UNLESS a health officer has had the opportunity of visiting one of the quarantine stations maintained by the Department of National Health of Canada, it is unlikely that he will appreciate fully the significance of the recent amendments to the maritime quarantine regulations.

The department has maintained four major quarantine stations, one on the Pacific coast, two in the maritime provinces, and the fourth in Quebec. Each station required the construction and maintenance of an extensive group of buildings providing accommodation for a thousand or more persons. Adequate facilities for disinfection and delousing, for the deratization of ships, and for bacteriological examinations have called for additional expenditures. The maintenance of the maritime quarantine service has represented more than twenty per cent. of the total expenditures of the Department of National Health. The new regulations will permit of the gradual abandonment of these large and expensive stations by substituting small, modern units consisting of detention quarters for not more than a hundred persons and a hospital unit of half a dozen beds, with laboratory facilities provided by the port health authorities. Inspection will be confined to vessels that report quarantinable diseases on board or have had such disease on board during the voyage or have come from an infected port. The large saving effected will make funds available for other needs of the department.

A resolution was unanimously passed by the Conference of the State and Provincial Health Authorities of North America in Vancouver last June and by the Canadian Public Health Association, urging governmental consideration of the recommendations presented by Dr. J. J. Heagerty. It is indeed pleasing that the recommendations made by Dr. Heagerty have been the basis of the amendments made to the maritime regulations both in the United States and Canada. The amendments are based on years of practical experience and bring the procedure into accord with our modern knowledge.

PRELIMINARY PROGRAM

CANADIAN PUBLIC HEALTH ASSOCIATION
ONTARIO HEALTH OFFICERS ASSOCIATION

Ottawa, June 17-19

THREE general sessions, three sessions of the Ontario Health Officers Association, and nine meetings of the various Sections of the Canadian Public Health Association call for the presentation of fifteen half-day programs each including from three to six papers presented by at least that many speakers.

Opening on Thursday, June 17th, promptly at 10 a.m., the Ontario Health Officers Association will hold its first session. Four important section meetings will also be held, namely, Public Health Nursing, Vital Statistics and Epidemiology, Laboratory, and Mental Hygiene.

At 2.30 p.m. the first general session will be convened in the ball room. The program committee, in keeping with the active steps being taken in the serum treatment of pneumonia in the United States and the enlarged program undertaken in the control of venereal disease, has arranged for two guest speakers to present these important subjects. Dr. C. E. Hill, President of the Ontario Health Officers Association, will discuss certain problems of health administration which are common to all health officers. At this session also, Dr. F. W. Jackson, Deputy Minister of Health and Public Welfare of Manitoba, will present the findings of the department in regard to the important subject of poliomyelitis. The Manitoba epidemic of last summer was one of the most serious outbreaks of this disease in Canada. Realizing the need for greater attention to the subject of nutrition, Dr. E. W. McHenry, School of Hygiene, University of Toronto, will discuss some of the causes of malnutrition.

The twenty-sixth annual meeting will be formally opened in a special evening session. Following addresses of welcome, Dr. M. R. Bow, D.P.H., Deputy Minister of Health of Alberta, will deliver his address as President of the Canadian Public Health Association. The second address of the evening will be given by Dr. R. E. Wodehouse, D.P.H., Deputy Minister of Pensions and National Health, on the Federal Department of Health. At this session also honorary life membership will be conferred on three distinguished sanitarians.

Friday morning will afford the opportunity for the second meeting of the Ontario Health Officers Association, when a program of short papers on communicable diseases will be presented. The sections of Public Health Nursing, Laboratory, Vital Statistics and Epidemiology, and Industrial Hygiene will provide programs of interest to all health officers.

The Corporation of the City of Ottawa has generously arranged to entertain the members of the associations at the Municipal Water Filtration Plant at noon. This filtration plant is one of the most modern on the continent and the visit will be highly instructive. The afternoon will be free for sightseeing and the committee on entertainment have planned to occupy fully this and every other available hour.

On Friday evening the annual dinner of the associations will be held. The speakers will be the Hon. Mr. C. G. Power, Minister of Pensions and National Health and Honorary President of the Canadian Public Health Association, and Dr. F. G. Boudreau, who recently returned to the United States after serving for several years as Chief of the League of Nations

Service of Epidemiological Intelligence and Public Health Statistics to assume the executive direction of the Milbank Memorial Fund.

The third general session will be held on Saturday morning in the ball room. Among the subjects to be presented are puerperal fever, by Dr. Ronald Hare, late of Queen Charlotte's Hospital, London; accident control, by Dr. N. L. Burnette, Ottawa, chairman of the committee of the Association investigating this subject; mental hygiene, by Dr. Grant Fleming, Dean of the Faculty of Medicine, McGill University; and health administration, by Dr. D. V. Currey, Medical Officer of Health, St. Catharines.

The program will be published in detail in the June issue of the *Journal*.

POINTS OF INTEREST IN OTTAWA

Continuing the series of short articles on the various departments of government engaged in public health work, the activities of Ottawa's Department of Health, of the National Research Council, the Laboratory of Hygiene, and the Public Archives, are presented in the following pages.

PUBLIC HEALTH SERVICES IN OTTAWA

THE City of Ottawa has a population of 142,000 and an area of 6,151 acres of which 856 acres are covered by water. The population within a ten-mile radius of the city is considerably over 200,000, including the city of Hull, Quebec, and a number of municipalities adjoining Hull and Ottawa on both sides of the Ottawa River.

The city serves as a hospital centre for a large section of Eastern Ontario and the adjoining area of the Province of Quebec, there being over 1,500 beds in general and special hospitals and two large institutions for the care of incurables.

The average death rate for Ottawa, during the past five years, has been 10.7, and the birth rate 21.4. The maternal mortality rate has averaged 4.4 per 1,000 live births.

Communicable Disease Control

The city maintains a 135 bed isolation hospital which, while not a new building, has been remodelled and modernized. It is arranged on the cubicle system, equipped with operating room and x-ray, and has a resident, visiting, and consulting staff of physicians. The hospital operates its own ambulance service and also a training school for communicable-disease nursing for graduate and undergraduate nurses.

Dr. W. T. Shirreff, the superintendent of this hospital, also acts as epidemiologist and assistant medical officer of health.

The isolation hospital was formerly used chiefly for the treatment of scarlet fever and diphtheria but, since the almost complete elimination of diphtheria from the city, space has been available for the treatment of any type of communicable disease requiring hospitalization.

Immunization against diphtheria has been carried out for the past six years, toxoid clinics being held in the baby stations and in the Public and Separate schools with the result that from 626 cases and 26 deaths in 1920 the incidence of this disease has fallen in 1936 to 31 cases with no deaths.

Immunization against scarlet fever and whooping cough is now being carried out at the baby stations on a limited scale and vaccination against smallpox is being constantly urged. There is, however, a much larger percentage of the school population protected against diphtheria than against smallpox.

The city also maintains a smallpox hospital with a capacity of sixty beds but this institution has not been required during the past six years.

Tuberculosis Control

Ottawa has a modern tuberculosis

sanatorium of 210 beds of which 35 are reserved for children of the non-infectious type. This institution is usually operating to full capacity, admitting cases from the surrounding districts of Ontario as well as city cases.

The sanatorium also holds out-patient clinics, 106 being held during the past year with an attendance of 2,450. In addition, 104 out-patient clinics for pneumothorax refills were held. About 60 cases were treated as out-patients by this method during the year, being rendered non-infectious and enabled to continue their treatment at home, allowing the hospital to care for 60 more cases as hospital patients.

Another out-patient clinic for tuberculosis is operated by the May Court Club Dispensary. Last year 91 clinics with a total attendance of 1,816 were held.

Two nurses paid by the Antituberculosis Association devote their full time to attendance at the clinics and to follow-up work with patients and contacts.

The results of the antituberculosis efforts in the city may be judged by the fall in the tuberculosis death rate from 230 per 100,000 in 1902 to an average of 49.6 in the last five years.

Venereal Disease Control

A clinic for the diagnosis and treatment of venereal disease is operated by the Board of Health in suitable premises, centrally located. The clinic requires the part-time services of three physicians and one nurse and the full-time services of two nurses and one orderly. A close follow-up of cases and family contacts is maintained by the nurses and occasionally court proceedings are resorted to in order to ensure adequate treatment and protection of the public. The cost of operating the clinic is partly covered by a provincial grant. The director of the venereal disease clinic is Dr. J. Pritchard.

Another venereal disease clinic for

RIDEAU STREET, OTTAWA, LOOKING EAST FROM CONNAUGHT PLACE

The Chateau Laurier and the Daly Building, in which is accommodated the Department of Pensions and National Health, are on the left. On the right is the entrance to the Union Station.

women and children is operated in connection with the day nursery. The city pays a grant in support of this clinic and the nurses of the Health Department clinic assist.

Laboratory Service

The Ontario Department of Health some years ago took over the City Health Department laboratory and has since operated it as a Branch Laboratory of the province, the city providing the building and paying part of the operating cost. This arrangement has been quite satisfactory to the medical profession and to the Local Board of Health.

The laboratory carries out all routine public health examinations for the physicians of the city and district, all necessary examinations for the Board of Health in connection with water, milk, food, etc., and also for the venereal-disease clinic and the isolation hospital. The laboratory also serves as a distributing centre for biological products and diagnostic outfits which are supplied free by the Ontario Department of Health. The director of the laboratory is Dr. Frank Letts, D.P.H.

Public Health Nursing

The public health nursing staff is composed of a supervisor and twelve district nurses, each of whom is responsible for a district wherein she carries out child welfare work and also nursing inspection of the pupils in the Separate schools as well as supervising infant boarding homes and investigating cases of suspected communicable disease. The three baby health stations, maintained by the local Health Department, are open every afternoon for the weighing of babies and giving advice to mothers in connection with infant care, and at each station once a week a physician holds a clinic for those requiring medical advice in regard to feeding. Cases of illness, other than those due to feeding problems, are referred to their own physicians or to the appropriate hospital clinic.

During the year 3,031 babies were brought to these stations, the total attendance being 12,875. The number of new cases attending the baby health stations represents 41 per cent. of the births.

The baby stations are also used as immunization centres for vaccination, diphtheria toxoid, and recently for immunization against scarlet fever and whooping cough. The home visiting by the public health nurses in connection with prenatal and infant welfare work is considered the most important part of their duties, 29,000 such visits having been made during the year.

Medical School Inspection

Medical inspection in the Public schools is carried out by one physician and five nurses employed by the Public School Board.

Meat and Food Division

The division is staffed by three veterinary inspectors and two lay inspectors; the head of the division is Dr. J. B. Hollingsworth.

The milk supply of Ottawa comes from 762 dairy farms in the provinces of Ontario and Quebec, 90 per cent. being within a radius of fifteen miles from the city. All farms shipping milk to the city are under licence and inspection by the inspectors of the Local Health Department and all cows are tuberculin tested by federal inspectors.

There are fourteen pasteurizing plants which pasteurize more than 99 per cent. of the milk supply. These plants are under frequent inspection and during the year nearly 3,000 samples of milk and cream were examined at the Laboratory.

All meat sold in Ottawa is required to bear the stamp of Dominion Government inspection or to be brought, with organs attached, to the meat inspection building of the local Health Department for examination and stamping by a veterinary inspector.

All wholesale and retail establishments dealing in foodstuffs are under licence and inspected by officials of this division.

Water Supply

The city's water supply is taken from the Ottawa River at Lemieux Island. The raw water is highly coloured, at certain seasons has a high turbidity, and is very soft and somewhat corrosive to pipes. The water is treated at a modern purification plant, which operates on the rapid-sand-gravity system, and delivered to the city under pressure of 80 to 100 pounds. The purification plant has a capacity of 35 million gallons per day which can in the future be increased to 84 million.

The filtered water reservoir has a capacity of six million gallons or about 8 hours' supply.

The average amount of water filtered is 17½ million gallons which supplies the City of Ottawa and several suburban municipalities, a population of 158,000. The per caput daily consumption of water is 111 gallons. The cost of supplying filtered water is 15.33 cents per 1,000 gallons. On account of the softness of the raw water, it is necessary to add a small amount of lime before filtration to secure a satisfactory floc with the aluminium hydrate and also to correct the corrosive property of the water. During the month of August and sometimes in September the growth of algae in the river water requires the use of activated carbon treatment at the plant to remove undesirable taste —a method which has proved very effective.

The results secured by this modern and efficiently operated plant have been most satisfactory and a visit to the plant would be well worth while to anyone interested in public health.

The water works engineer is Mr. W. E. MacDonald, C.E.

The staff of the Ottawa Health Department will be very pleased to welcome any visitors attending the convention and to show to those interested the details of any phase of the work of the Department.—*T. A. Lomer, M.D., Medical Officer of Health.*

THE NATIONAL RESEARCH COUNCIL

IN 1916 the Government of Canada, following the example of the British Government, set up a Committee of the Privy Council on Scientific and Industrial Research, consisting of seven members of the Dominion Cabinet under the chairmanship of the Minister of Trade and Commerce. An Honorary Advisory Council for Scientific and Industrial Research of eleven members was then appointed. In 1917 the Research Council Act established the Council as a permanent organization. Its members, now fifteen in number, are appointed by the Council for a period of three years, and meetings of the Council are held quarterly. Council members serve without fee or salary, but are reimbursed for their travelling expenses.

Organization

Activities of the Council may be grouped under the two headings: the work in the laboratories and the work done elsewhere with assistance of the Council.

Under the president, who is the chief executive officer, and apart from administration, which is organized much on the usual lines of a department of Government, the staff of the Council is grouped in a number of divisions, each under a director: Research Information, concerned with the collection, collation and issue of scientific information and with the general planning of co-operative investigations through committees, etc.; the Divisions of Biology and Agriculture, of Chemistry, of Physics and Electrical Engineering, of Mechanical

Engineering, including Hydraulics and Aeronautics, are responsible for the direction and conduct of the technical work in the fields indicated by their designations. Provision is made for the closest co-operation and collaboration between all branches concerned in any particular problem. At the present time the staff comprises a total of 163, of whom 67 are graduates or post-graduates. There are also 31 additional research workers, of whom 9 are graduates, employed directly under committees.

THE NATIONAL RESEARCH BUILDING

Headquarters of the National Research Laboratories, accommodating the Divisions of Biology and Agriculture, Chemistry, Physics and Electrical Engineering, Mechanical Engineering, and Research Information.

In order to bring to bear the knowledge of scientific men and industrialists, and to correlate the work of all research organizations concerned, the Council from its inception has established, as required, *ad hoc* associate committees to study specific problems and either to direct research under their own auspices or to advise the Council regarding difficult problems of general interest. An example of the way research workers can be brought together to study a given problem is found in the Associate Committee on Tuberculosis. Its membership includes representatives of the different departments of the several universities; the medical association; the other medical research institutions; officers of government departments and the National Research Council, and it is thus enabled, as an impartial body, to scan the work in progress throughout the Dominion and to suggest lines of collaboration that seem to offer hopeful prospects. The Council has thirty-three committees of this kind at present in operation.

For 1937-38 the Council has awarded forty-seven scholarships for post-graduate research, chiefly at Canadian universities. In addition to five special scholarships tenable in the National Research Laboratories, which were awarded to enable the holders to obtain experience along industrial research lines prior to entering commercial work, there were forty-two fellowships, studentships and bursaries given for work at the universities.

The Laboratories

The new building of the National Research Laboratories stands on a ten-acre site beside the beautiful Rideau Falls which marks the confluence of the Rideau and Ottawa rivers. Of steel frame construction, faced with Wallace sandstone from Nova Scotia, standing on a base of gray Scotstown granite from Quebec, the building is 418 feet long, 176 feet wide and 60 feet high.

Severely classic in style, with a colonnade of eight free-standing Roman Doric columns on each side of the central entrance on its main facade, the building has been carefully planned both to fulfil its functions as a research laboratory and to take full advantage of the great architectural possibilities offered by such a structure.

Comprising four storeys and basement, the structure encloses two large interior courtyards, which give ample light to all laboratory rooms overlooking them. Under each courtyard is an arched exhibition hall, one of which has been partly fitted up as an aeronautical museum.

Across the Rideau River, in several buildings which were used as temporary laboratories while the new structure was being erected, are the aeronautical laboratories, including the wind tunnel, the model-testing basin, the engine-testing laboratories, the aircraft and allied instruments shop, the oil burner, gas and oil laboratories, and the general workshops.

In the main building the auditorium and the library occupy the central section. On either side are large interior courts. The laboratories of the several divisions open off both sides of corridors which run around three sides of these two courts.

Biology and Agriculture, and Chemistry are housed in the west wing; Physics and Electrical Engineering in the east wing.

Biology and Agriculture

Work in progress in Biology and Agriculture includes studies of malting methods, malt analysis, enzymes and barley proteins, standardization of experimental milling and baking tests on wheat and wheat flour, problems in the storage and transport of foods, hybridization of wheats and wheat grasses, looking to the development of perennial wheat as an aid to the rehabilitation of the drought areas on the prairies, and statistical studies on meteorological and agricultural data.

Chemistry offers a wide and diversified field of study that sometimes yields spectacular results. A new distillation column has been developed that has been taken up by industry. Synthesis of plant hormones that promote root formation on cuttings has been accomplished. Starch studies are opening the way for a wider use of potato starch in industry. Formalin treatment of wheat for smut is being studied. Methods of measuring the covering power and life of paints, varnishes and lacquers are being investigated. A wax suitable for use in poultry plucking has been developed and commercialized. Asbestos is yielding active silica and other useful products in the hands of the chemists. Maple sugar that does not harden on aging has been produced and new uses for other maple products are being found. In the laundry laboratory, a service is being given to power laundries of Canada that enables them to prolong the life of clothes and to give their patrons better laundering. A textile laboratory is studying the problems of the wool, rayon and cotton industries. The magnesite laboratories have re-established an industry and developed a long line of new refractories. An agreement with the company has enabled the Council to expand the investigational work in this field with funds provided by the industry. Leather, rubber, corrosion of metals, dehydration of foods, studies in the industrial uses of soya beans and other agricultural products are among the other subjects engaging attention in this division.

Physics and Electrical Engineering

includes many practical investigations as well as researches on subjects of fundamental scientific importance.

An investigation is in progress to find a suitable method of measuring the intensity of very hard x-rays and radium gamma rays in the practical units that have been developed for medical use with ordinary x-rays. Radium preparations are measured and certified. Heat and sound insulation are receiving attention. A new system of heating refrigerator cars has been developed and patented. It is being widely adopted. Primary standards are used to check gauges required for accurate industrial work. Apparatus has been devised that enables aerial photographic information to be converted into map form by mechanical means with consequent greater accuracy and speed than was ever possible by hand. Control of voltage to within a tenth of one per cent. is now possible through the use of apparatus developed in these laboratories. Testing of oil burners and a certificate from the Council are now required before any type of oil burner can be sold in Canada. Radio research is progressing along practical lines. A three-meter concave grating with 30,000 lines to the inch permits accurate work to be done in spectroscopic analysis of minerals and other materials. Standardization of electrical measuring units and the checking of all types of electric meters are also done. Valuable data have been obtained on the hazards in the use of soda-acid fire extinguishers in fighting fires where high tension currents may be intercepted. The practical use of electricity in novel ways, as in the electrocution of poultry, has been investigated.

Mechanical Engineering is a division of the laboratories in which a great deal of testing work that cannot be done elsewhere in Canada is carried on. This is particularly true of the wind tunnel and model-testing basin, both of which are used for a great variety of tests. The lift and stability of aeroplanes, the design of locomotives to avoid the blinding of engineers by the smoke from their own engines, determining the speed-power relation of patrol boat and pleasure yacht hulls, the strength and dependability of aircraft floats and skis, the shape of roof ventilators, are all typical subjects of investigation. Mention has already been made of the instrument shop for the construction and checking of instruments (mostly for aircraft) and of the gas, oil and engine laboratories in this division.

A tour of the National Research Laboratories impresses the visitor not only with the extent and variety of the research work in progress, but with the need for the extension of work of this kind in Canada, in order that the best possible use may be made of the country's extensive natural resources.—*Maj.-Gen. A. G. L. McNaughton, C.B., C.M.G., D.S.O., M.Sc., LL.D., President.*

THE PUBLIC ARCHIVES OF CANADA

THE Public Archives Building in Ottawa is a large, airy, fire-proof, three-storey stone building situated on Sussex Street, alongside of the Royal Mint. The older of its two wings was completed in 1905, the later in 1925. Of these, the older is, in the main, given over to offices and workrooms, the newer to filing rooms and exhibition rooms. The whole forms the headquarters of the Public Archives of Canada, which is an independent department of government administered by the Dominion Archivist and Keeper of the Records under the direction of the Secretary of State of Canada.

The Department has branch offices in Montreal, London and Paris. These are engaged chiefly in the acquisition

or transcription of documents having archival or historical interest for Canada.

The duty of the Public Archives is to preserve the records of the federal government that are no longer in current use in the various departments and offices to which they once belonged. The great bulk of the pre-confederation records that became the property of the Dominion Government in 1867 are in the Archives, and also, of post-confederation records, considerable series from the Governor-General's Office down to 1904, from the Department of Agriculture to 1891, from the Post Office to about 1900, from the Department of National Defence to about 1920, and from the Royal Canadian Mounted Police to about 1916, as well as some small collections from other departments and branches. There are also archives produced by British imperial services in Canada, including the headquarters papers of the British Army in America from the end of the American Revolutionary War to the withdrawal of the garrisons from Canada in 1870, the papers of the Vice-Admiralty Court at Halifax, and some of the early papers of the British naval station at Esquimalt, B.C. The primary need met by the preservation of these archives is official—they are used for administrative, legislative and especially judicial purposes. It has been said, "No records, no history", but it is almost equally true, "No records, no government". However, the secondary purposes served are historical, literary, genealogical, etc., and the documents, especially those of date prior to Confederation, are used far more frequently in investigations of this kind than in official business.

PUBLIC ARCHIVES BUILDING

The Grey Room, one of the three main exhibition rooms on the ground floor.

In order that the records in Ottawa may be as complete as possible the Department has for many years carried on the copying of documents relating to Canada that are preserved in the National Archives and the National Library in Paris, France; in the Public Record Office, the British Museum,

and the Hudson's Bay House in London; in other public and private depositories in France and the British Isles; and in Quebec, Montreal, Halifax, and elsewhere in Canada.

Inasmuch as the public records are the most important sources for the history of a country, it is to the Archives in Ottawa that students and investigators of Canadian history must first come for their information. Recognizing this, the Government of Canada has enlarged the scope of the Department and enabled it to acquire and preserve many kinds of historical records in addition to those of strictly official origin, and as a result the Public Archives has become also, in a sense, a department of national history. There are collected here great masses of private papers, originals or copies, having importance for Canadian history; a large reference library, including the most important collection of Canadian pamphlets in existence; an extensive series of newspapers, in which are found many early issues that are now almost unknown; over 30,000 maps and about the same number of pictures. Although the Department has never attempted to maintain an historical museum, it has on display many objects of great interest.

It is thus possible for the worker in Canadian history to find, concentrated in one building, the greater part of, and sometimes all, the material which he requires in whatever field he may be interested.

On entering the main door the visitor turns to the left and proceeds to the chief exhibition rooms, known respectively as the Minto, the Northcliffe and the Grey rooms. In the Grey Room is to be seen the wonderful model of Quebec which was made about 1805 for the British War Office by a Canadian member of the Royal Engineers, J. B. Duberger. In the Northcliffe room is the collection of manuscripts and pictures which were donated by Sir Leicester Harmsworth as a memorial of his brother, Lord Northcliffe. Here, too, is a famous original portrait of General James Wolfe, Benjamin West's original painting of the Death of Wolfe, and Sir Thomas Lawrence's portrait of the Earl of Durham, author of Lord Durham's Report. Throughout these rooms, and, indeed, throughout the building, the walls are covered with pictures of Canadian interest, and there are many glass cases displaying books, manuscripts, pictures, maps and museum articles. Also on the ground floor, to the right of the main entrance, are two rooms containing an interesting collection which came to the Archives by the will of the late Colonel William Molson Macpherson of Quebec.

On the second floor are the library, two manuscript rooms, and the students research room, where properly accredited investigators are allowed to carry on their work at all hours of the day and night. In addition to the departmental papers, of which some mention has been made, the manuscript rooms contain the papers of such personages eminent in Canadian history as Montcalm, Vaudreuil, Wolfe, Moncton, Townshend, Murray, Dartmouth, Shelburne, Selkirk, Neilson, Dalhousie, Durham, Bagot, Sir John Macdonald, Joseph Howe, Sir Charles Tupper, Sir Wilfrid Laurier.

On the third floor are the map room, the prints and drawings room, and the war posters and war photographs room. Over 7,000 posters, chiefly Canadian, but including almost all the nations which took part in the Great War, and over 700 photographs, enlarged and coloured, of the Canadian troops at the front and of various war activities, are to be seen in this room. On the third floor also are the bindery department and the photographic department, both of which are kept constantly occupied by archival work.—*James F. Kenney, M.A., Ph.D., Acting Dominion Archivist.*

THE LABORATORY OF HYGIENE OF THE DEPARTMENT OF PENSIONS AND NATIONAL HEALTH

THE "Act Respecting the Department of Health", passed on April 11, 1919, declared in Section 4, Subsection (b), for "the establishment and maintenance of a national laboratory for public health and research work". Accordingly, the laboratory, under the title of "The Medical Research Laboratory", was begun late in 1921 and it was ready to function a year later with a staff of two in the field of bacteriology only. It was soon appreciated, due to the urgent need of assisting in carrying out neglected provisions of the Food and Drugs Act, that research would have to be placed in the background, and plans were altered to embrace all the features of a "control" laboratory to scrutinize the potency of sera and other biological products and of certain drugs. In consequence, there was added a pharmacological laboratory in 1923, and operations began to be moulded along lines similar to those of the National Institute of Health in Washington, D.C., and the name was then changed to the Laboratory of Hygiene.

Progress and organization of work were slow at first, due to difficulties in securing adequate space, but this was gradually overcome and much needed additions to staff were made. In 1928, with the promulgation of the revised Regulations to the Food and Drugs Act, the work and functions of the laboratory increased greatly, and the staff now numbers fourteen with further additions in the near future.

The activities of the laboratory at present encompass the continuous examination by the Pharmacological Branch of market samples of tinctures of digitalis and strophanthus, fluid extract of ergot, extract of pituitary gland (posterior lobe), thyroid, epinephrine hydrochloride solution and the arsphenamines; assistance is rendered the Narcotic Division in the identification of materials under seizure; and comparative standards are prepared and checked against standard materials forwarded by the Medical Research Council of Great Britain representing the Biological Standards Committee of the League of Nations in respect to digitalis leaf, ouabain crystals for testing tincture of strophanthus, ergot, epinephrine, pituitary extract (posterior lobe) and arsphenamine and issued to manufacturers in Canada and elsewhere upon request.

To the Bacteriological Branch are assigned testing of the potencies and sterility of antisera, toxin-antitoxin mixture and toxoids for which definite standards are set by the Regulations to the Food and Drugs Act; testing the sterility of other biological products for which there are no Canadian standards of potency; the yearly inspection of the plants of manufacturers licensed by the Department to make biological products; in association with the Food and Drug Laboratory in the bacteriological examination of a complexity of food products, either canned or fresh; the examination of various classes of disinfectants; and clinical laboratory diagnosis on a restricted scale. In addition to such stated activities the laboratory has to conduct bacteriological surveys of the waters overlying many shellfish areas and of shellfish themselves to permit of certification for export to the United States or foreign countries of these seafood products.

The laboratory also stands ready to render practical assistance to the Division of Quarantine whenever asked for should cholera, plague or typhus fever prominently make themselves apparent in ship-borne trade or passenger traffic.

Research problems in line with the general type of work outlined also claim the attention of the staff, and several worthy contributions have already been made.—*Norman MacL. Harris, M.B., Chief, Laboratory of Hygiene.*

PLANS, PROGRAMS, AND PROGRESS

Consolidated By-Laws, Department of Health, Hamilton, Ontario

DR. James Roberts, Medical Officer of Health, has led the way for more effective health administration by publishing in one volume all the by-laws relating to public health. The endeavour has been to collect and unify the various enactments, including the Public Health Act and other provincial statutes including the Factory, Shop and Office-Building Act, the regulations of the Department, and the by-laws of the Municipal Council, so that these will be readily available for everyday use.

Suitable revision of by-laws was undertaken as the need was manifested in collating the various enactments. In a volume of 340 pages the building by-laws are presented, together with the public health by-laws related thereto. The building by-laws are given in detail, including such subjects as restrictions, construction, fireproofing, heating, and special requirements for certain occupancies. The volume is furnished with a detailed index.

For years Dr. Roberts has given attention to the problem of housing. The public have been informed regarding conditions not only by the Health Department but through local social agencies. The building by-laws in Hamilton have been recognized as being up-to-date, effective, and in accord with health requirements. In few cities has a more sincere and effective effort been made by the Health Department to improve housing conditions than in Hamilton.

Annual Meeting, Saskatchewan Health Officials' Association

THE ninth annual meeting of the Saskatchewan Health Officials' Association will be held in the Bessborough Hotel, Saskatoon, on Friday, June 4th. An attractive program has been arranged. Dr. W. H. Orme, Department of Public Health, Saskatoon, is president and Dr. C. F. W. Hames, D.P.H., Provincial Department of Public Health, Regina, is secretary.

Conference on Social Work

THE fifth annual Conference on Social Work will be held in the Chateau Laurier, Ottawa, June 1st, 2nd and 3rd. Immediately preceding the sessions the Canadian Welfare Council will hold its seventeenth annual meeting on May 31st. Details of the Conference may be obtained from Miss J. A. Maines, Secretary of the Council of Social Agencies, 172 Wellington Street, Ottawa, or from the office of the Canadian Welfare Council.

Personals

AN appointment of special interest is that of P. A. T. Sneath, M.D., D.P.H., in the Colonial Medical Service as first assistant in the Government Medical Health Service of British Guiana, Geogetown. Dr. Sneath resigned as lecturer in parasitology and hygiene and preventive medicine in the University of Toronto and as research assistant in the Connaught Laboratories to return to the Colonial Service. On graduating from the University of Toronto, he entered the Service, serving in the Gold Coast, West Africa. Later he returned to Toronto for post-graduate study in public health. On completing these studies he accepted the appointment in the School of Hygiene and Connaught Laboratories, being engaged in teaching and research.

J. G. Schaefer, B.Sc., has been appointed Sanitary Engineer for the Province of Saskatchewan and is acting as Director of the Division of Sanitation, Department of Public Health, following the death of Mr. R. H. Murray, C.E.

J. M. Hershey, B.Sc. (Med.), M.A., M.D., D.P.H., Ph.D., has been appointed Medical Officer of the Peace River Health District with headquar-

ters at Pouce Coupe, British Columbia, succeeding J. S. Cull, M.D., D.P.H. Dr. Cull has been appointed Medical Director of Health Unit No. 4, Vancouver, under the Metropolitan Health Committee.

Miss Elsie Hickey has been named Director of Public Health Nursing for the City of Toronto on the recommendation of Dr. Gordon P. Jackson, D.P.H., Medical Officer of Health. Miss Hickey joined the staff of the Department of Public Health in 1915 and for some years has been supervisor of communicable disease nursing. She succeeds the late Miss Nora Moore.

DAVID ALEXANDER STEWART, B.A., M.D., F.R.C.P.(C.), LL.D.

DR. David A. Stewart, Superintendent of Ninette Sanatorium, Manitoba, and an internationally known authority on tuberculosis, died in Winnipeg on February 16th, after a long illness. He was sixty-three years old.

Dr. Stewart was born at Fletcher, Keith County, Ontario, and was educated there and at Chatham, Ontario. Later, when his parents moved to Morden, Manitoba, he entered the University of Manitoba and graduated in Arts in 1899. He had planned to enter the Presbyterian ministry but his voice failed while he was on a mission field in Frank, Alberta, and he entered medicine, graduating from Manitoba Medical College in 1906. After serving for two years as an intern in the Winnipeg General Hospital, he became Field Secretary of the Anti-Tuberculosis League of Manitoba and travelled throughout the province educating the public as to the curability of tuberculosis and raising funds by public subscription for a sanatorium. Overwork resulted in a breakdown and it was discovered that he had tuberculosis. After a year of rest and treatment at Trudeau Sanatorium, Saranac Lake, N.Y., he was able to return to Manitoba and completed his efforts to raise funds for the tuberculosis sanatorium. Pelican Lake, near Ninette, was chosen as the site of the sanatorium and the first buildings were erected in 1910, with accommodation for sixty patients. Dr. Stewart became its first superintendent and continued in that position until his death—a period of 27 years. In that time he succeeded not only in providing for Manitoba one of the outstanding sanatoria on the continent but in developing an anti-tuberculosis program for that province, and in fact for Canada, which has resulted in the greatly reduced death rates and incidence of tuberculosis. Although never physically strong, he did not hesitate to assume the burden of new work if he felt that he could help meet the need, particularly if it related to the sufferer from tuberculosis. Few men have received such rich tributes of appreciation as Dr. Stewart received on the occasion of his twenty-fifth anniversary as superintendent; and of all the tributes, none were more highly valued by him than the many letters from ex-patients of the institution in which he had invested his life. His writings in tuberculosis will be treasured as the years pass. Every article expressed vividly the problem of tuberculosis and he never failed to put forward suggestions of the greatest practical value.

Dr. Stewart's retiring nature led him to refuse many of the honours which were offered to him. It was pleasing to all his friends that he accepted an honorary LL.D. degree from the University of Manitoba and the presidency of the Manitoba Medical Association.

In every sense, his life and his contribution to life were unique. In the history of the tuberculosis movement in Canada, no name will stand higher than that of David Stewart.

BOOKS AND REPORTS

Population Movements. *Robert R. Kuczynski, Department of Social Biology, London School of Economics. The Oxford University Press, 480 University Avenue, Toronto, 1936. 121 pages. $1.50.*

SINCE the publication of a monograph on population trends in England and Wales by Dr. Enid Charles, the general interest in this question has become more widespread.

"Population Movements" is an extremely interesting volume based on three public lectures given by the author at the University of London in March, 1936. Its only defect seems to be its ruthless terseness; from the standpoint of a new student of the subject, further elaboration of many fundamental points in the text would have been welcome. The first part of the book deals with our knowledge of the population of the earth and the peopling of America, and the second is devoted to a discussion of two of the factors which influence population, namely, reduction in mortality and decline in fertility. The balance of births and deaths in England and Wales and in other European and American countries has become considerably less favourable since the War. The third section deals with the possibilities of increasing reproduction. Here the author states that "the decrease in fertility can be explained neither by decrease in fecundity nor by a decrease in the number of marriages nor by a rise in the age at marriage: fertility has decreased through the spread of birth control."

In concluding paragraphs of the book the author emphasizes the fact that following the Great War there was a complete reversal of the public attitude toward population growth, the general opinion now being to regard it with disfavour. The serious effects of lack of population growth are briefly commented upon and in the closing sentence it is stated that "if fertility and mortality remain constant or decrease to the same extent and if no conspicuous immigration takes place, a steady decline in the population of England and most countries of Western civilization will soon occur. At the same time every branch of industry is still carried on under the assumption that population will continue to increase."

Dr. Kuczynski's logical and scientific treatment of this subject is refreshing after the cannonade of dogmas regarding population growth to which we have been subjected during the depression years.

A. Hardisty Sellers

Tissue Immunity. *R. L. Kahn, M.S., D.Sc., University of Michigan, Ann Arbor. Charles C. Thomas, 220 East Monroe Street, Springfield, Ill., 1936. VIII+376 pages, including 90 illustrations. $7.50.*

THIS book presents the results of a courageous experimental attack upon the problem of "tissue immunity", a problem which seems to have been rather carefully sidestepped in times past in favour of the more tangible one of "humoral immunity."

The chapter arrangement is excellent. The questions to be dealt with, the experimental approach, the author's conclusions from the results obtained and finally the importance of the results in terms of practical immunology are given in that order in each chapter. Simplicity and clarity characterize the author's presentation in these pages.

The reaction of the tissues to the stimulation of foreign substances from the normal state through all the various stages of immunity, hypersensitivity and desensitization is analysed in this study. While the experimental approach to the various problems has not been exhausted and the conclusions arrived at may not receive universal acceptance, this book will be of substantial interest to teachers, clinicians and students of immunology.

F. O. Wishart

CURRENT HEALTH LITERATURE

These abstracts are intended to direct attention to articles that have appeared in other journals during the past month. Any of the journals referred to may be borrowed for three days or longer if desired. Address requests to the secretary of the Editorial Board.

Epidemiological Studies in Influenza

THIS review brings together the newer knowledge of influenza. The evidence that the etiological agent is a virus is fully considered, together with its characteristics, distribution and differences between strains isolated thus far. An interesting and important problem dealt with here is the relationship of human influenza virus to the common cold, swine influenza and certain other clinical conditions closely simulating influenza but from which no virus has yet been recovered.

Experimental results from immunity studies in animals are presented and the possibility of applying these findings in the therapeusis and prophylaxis of the disease in man is suggested.

Thomas Francis, Jr., Am. J. Pub. Health, 1937, *27*: 211.

Carrier-borne Typhoid Fever in New York State, with special reference to Attack Rates among Household Contacts

EXCLUSIVE of New York City, 570 typhoid carriers were discovered in New York State in the period 1911 to 1936. From the carrier-histories of these individuals and from a survey of as many households of existing carriers as possible, an analysis has been made of the relative efficiency of the different methods leading to detection of the chronic carrier state and of factors influencing the carrier spread of typhoid.

Epidemiological study of sporadic cases was responsible for 72 per cent. of carrier discoveries. This method becomes more efficient as typhoid incidence decreases. Case-release requirements accounted for 20 per cent. The remainder were discovered through examination of routine specimens for other conditions and of specimens from food handlers. The authors consider that the results from this latter group did not justify the work involved.

In this survey cases of typhoid fever among the household contacts of carriers were found to be 42 times more frequent than in the general population. Figures are quoted to show that in the households of cases, typhoid among contacts was 28 times more frequent than in the households of carriers. The ratio of typhoid among unvaccinated and vaccinated contacts in carrier households was found to be 5 to 1.

Ernest L. Stebbins and Elizabeth Reed, Am. J. Pub. Health, 1937, *27*: 233.

Rat Harborage and Ratproofing

THE rat still remains an important public health problem, particularly in relation to the transmission of plague and typhus fever. The structural detail of older types of buildings has provided rodents with ideal breeding places. An educational campaign is therefore proposed to acquaint the public and the building trades with the problem in order that existing "rat harborages" may be eliminated where possible and new structures rendered ratproof by proper choice of design and material and subsequent maintenance inspection.

B. E. Holsendorf, Pub. Health Rep., 1937, *52*: 75.

Measurements of Ultraviolet Radiation and Illumination in American Cities, 1931 to 1933

DURING a survey of atmospheric pollution in the principal American cities, the opportunity was taken to measure ultraviolet radiation and illumination under widely varying conditions. From a study of these measurements (reported in Public Health Bulletin No. 233) a ratio has been derived whereby the approximate amount of antirachitic ultraviolet radiation can be determined when the value of illumination is known.

Pub. Health Rep., 1937, *52*: 355.